HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews in the present number are by W. Corbett of the Glasshouse Demonstration Station, Wilmington, H. R. Oppenheimer of the Rehovot Research Station, Palestine, J. M. S. Potter of the R.H.S. Gardens, Wisley, H. M. Tydeman of the East Malling Research Station, and G. St. C. Feilden.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

. RIGG, T. (CAWTHRON INSTITUTE). 63(931)
The contributions of the Cawthron Institute to science and New Zealand Agriculture; with bibliography of scientific papers and reports.
Cawthron Inst., Nelson, N.Z., 1945, pp. 58, bibl. pp. 20.

s Silver Jubilee Commemoration Lecture of 29 October, , the Director of the Cawthron Institute reviews the done during the past 25 years and summarizes thus: nong the more outstanding contributions of the tute may be mentioned the establishment and develop- of soil surveys in association with the Department of ntific and Industrial Research; the elucidation of soil iency problems, particularly those connected with n, cobalt and magnesium deficiencies; the manuring uit, tomatoes, pasture and other crops and the control bscure physiological diseases of apples in cool store. qual importance must be placed the parasitic control oolly aphis, the golden oak scale and the Horntail ; the biological control of gorse seed and St. John's ; the studies of the life history of both insect pests fungus diseases and the researches which have been d out concerning tobacco diseases, black-spot of s, brown-rot of stone fruit and mildew and 'cloud' matoes." The great influence exerted by the Institute armers and citizens throughout New Zealand in ng an appreciation of scientific research is of equal rtance.

1232. CAWTHRON INSTITUTE (RIGG, T.). 63(931)
Silver jubilee of the Cawthron Institute 1920-1945.
Cawthron Inst., Nelson, N.Z., 1945, pp. 16.
A brief outline of the more important developments in the work of the Institute, lists of staff, etc.

1233. KELLAR, H. A. 63: 069
Living agricultural museums.
Reprinted from *Agric. History*, 1945, **19**: 186-90, bibl. 6.
The suggestions made include the reproduction of former agricultural and horticultural conditions at certain places, notably in the grounds belonging to places of historical interest.

1234. CHOUARD, P. 63(44)
Coup d'oeil sur la vocation agricole de la France au lendemain de la libération. **(Agriculture in France on the morrow of deliverance.)**
Reprinted from *Agric. prat.*, 1945, pp. 6-8, 38-40, 53-4.
As far as horticulture is concerned, the following developments are described as desirable: (1) Early vegetables in favourable climates. The small, privately owned market gardens in the immediate surroundings of big towns, in which small scale forcing of different vegetables is practised, should be partly supplanted by mechanized vegetable growing on a field scale within a wider radius of the centres of consumption. (2) Fruit growing. Efforts must be made to regain the leading position of France as the orchard of

Europe. The next step in the realization of this programme is co-operative organization. (3) Viticulture. In this field France still leads the world. Export of quality wines and liqueurs on a big scale will be aimed at. In the reconstruction of vineyards adaptation to mechanical cultivation is essential and consideration should be given to the production of non-fermented grape juice.

1235. PETROV. 634/635(47)
The Turkoman Experimental Station of the All-Union Institute of Plant Industry. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 188-91.
Five varieties of sweet almond have been bred, which, while equal in quality to standard varieties, are specially adapted to the conditions prevailing around Kopet-Dag. A table contains dates of flowering, figures for yields, and other information. The names of wine and raisin varieties of grapes are given. Ecological studies of almonds, pistachio, and pomegranate are being conducted—especially into the influence of irrigation on transpiration, wilting, and photosynthesis. Many ornamental plants are being introduced into the country. About 200 rose varieties are proving well adapted to the climate; some of them flower through most of the winter, and all retain their leaves throughout the year.

1236. TETEREV, F. K. 634/635(47)
The great transformer of Nature—Ivan Vladimirovič Mičurin. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 3-14.
This article contains no new information; some of Mičurin's writings are quoted in order to illustrate the development of his methods and ideas. Mičurin's earliest attempts at acclimatization, one method of which was mass selection, met with only limited success. It was only after he had based his theories on sound, "Darwinian", principles that he began to make headway. He hybridized species drawn from widely separate parts of the world, devising means of overcoming the obstacles to fertilization due to disparity of kind. He next subjected his plants to all manner of influences, employing, among other methods, that of mentors—his crowning achievement [see *H.A.*, 11: 384; 12: 1209, etc.]. The author is at pains to prove that Mičurin denied the validity of Mendel's principles.

1237. CHAPTAL, L. 581.14: 581.05
Contribution à l'étude du phytoclimat. (**A contribution to the study of phytoclimate.**)
Ann. Épiphyt., 1940, **6**: 133-44, bibl. 21.
Phytoclimatology is the intensity of the biological effect of the atmospheric conditions rather than a measure of the various meteorological factors. It follows that the determination of phytoclimates demands the use of special methods based on physics and biology. It is in comparing the meteorological data of one year with the corresponding normals that the climatic characteristics of that year can be determined. A determination of the climatic characteristics of a year often lead to inexact phytoclimatic deductions. An example is given for the Montpellier region during the seasons 1937-8 and 1938-9, two years when average temperatures and rainfall were fairly normal and showed many analogies. Biological and cultural data, however, showed that in the vineyard the meteorological conditions had very different effects, since 1937-8 was warm and dry whereas 1938-9 was exceptionally cold and moist. In 1938 grapes ripened badly because of the drought; in 1939 again they did not ripen well and the harvest was later than in the previous year, but this was because the vines had not received enough heat during the ripening period. Climograms are described and illustrated for 1938 and 1939 and show at a glance how the various meteorological factors differ during corresponding months for the two years. Plant development does not depend on juxtaposition of independent phenomena but on a successi of phenomena co-ordinated and interdependent. phytoclimatology not only the values of the meteorologi elements at any given moment are to be considered but a the accumulated effect of these elements since the beginni of growth; thus the biological action of the temperat on any one day cannot be separated from that of previous day and of the succeeding day. An applicati of this index is seen in the theory of summations of tempe tures, formerly extolled but now almost abandoned. sums of temperatures do not express more exactly than temperatures on which they are based the thermic conditi that support growth; they only state them more clear A method is described of using the deviations from normal of the sums of temperatures and of the rainfall every 5 days during the growing period. These deviati can be shown graphically. It is concluded that ordin curves of temperature and rainfall show atmosphe conditions, while climograms supply information as climatic conditions, and deviation curves of sums temperature and rainfall indicate the phytoclima conditions.

1238. ASHBY, E. 581.11(47)
Plant physiology in the U.S.S.R.
Nature, 1946, **157**: 558-61, 596-7, bibl. 38.
This article is intended to give some idea of the variety work going on in plant physiology in the Soviet Union, a the whereabouts of the principal workers; it descri chiefly the investigations at the Timirjazev Institute of Pl Physiology of the Academy of Sciences at Moscow. Director of the Institute is the veteran Academician Ba but he is now nearly 90 years old and the acting directo N. A. Maximov, who has organized the institute into laboratories, each with a leader and 4 or 5 assistants. Th laboratories are concerned with (*a*) Photosynthesis (L. Ivanov), (*b*) Water relations and growth (N. A. Maximo (*c*) Cell physiology (Prof. P. A. Henkel), (*d*) Developm (M. H. Čailachjan), (*e*) Comparative physiology (P A. A. Nichiporovitch), (*f*) Bioenergetics (Prof. V. Tausson), (*g*) Reproductive processes (Dr. J. V. Rakit (*h*) Mineral nutrition (Prof. E. E Ratner), (*i*) Winter re tance (Dr. E. E. Tumanov), (*j*) Trace-elements (D. Prianisknikov). The work in progress in each of th laboratories is outlined. The institute has also a w equipped laboratory for optical work. Of special inte to horticulturists are: (1) Rakitin's work on the ripe processes in fruit (mostly fruits with juicy pericarps); he followed during ripening the trends in gas exchange, enz activity, internal atmosphere, chemical composition, the effects of growth stimulants, and has designed a port apparatus for hastening the ripening of fruits by ethyl which is now used on many collective and state farms ripening tomatoes, and (2) the work of Tumanov, who been studying the effects of growth-promoting substa on frost resistance in fruit trees. Outside the Institut Plant Physiology research is also in progress in many o similar laboratories, e.g. the Laboratory of Photosynth Komarov Botanical Institute of the Academy of Scie Vernadsky Laboratory of Geophysical Problems, Acad of Sciences; certain research institutes and stations u the People's Commissariat of Agriculture; and at Universities.

Growth phenomena.

1239. ZHDANOVA, L. P. 577.15.04
Geotropic reaction of leaves and content of growth hormone in plants.
C.R. Acad. Sci. U.R.S.S., 1945, **49**: 62-5.
Experiments are described with leaves of *Hydra Perilla*, mustard, Jerusalem artichoke, *Vicia faba* tomato. The geotropic reaction of leaves severed fro

lant only occurs when they are oriented with their dorsal de uppermost. Epinasty and hyponasty of the leaves robably depend on the concentration of the growth ormone and on the difference in the intensity of the rowth processes in the ventral and the dorsal sides of the etiole. The degree of the geotropic reaction of the leaves epends on the content of growth hormone and on the ifference in the intensity of the growth processes in the entral and the dorsal sides of the petiole. The degree of ie geotropic reaction of the leaves depends on the content f growth hormones which are synthesized in the apical uds of the stem.

240. DE ROPP, R. S. 631.541
***In vitro* grafts.**
Nature, 1946, **157**: 628-9.
'he author describes and illustrates grafting experiments *i vitro* with fragments of cambium from *Vinca rosea*, and ith bacteria-free crown gall sunflower tissue on to a stem ulture of normal sunflower tissue. He concludes that: 'hese experiments suggest that the technique of *in vitro* rafting may be of special value as a means of demonstrating rowth hormones produced by various types of living tissue, i addition to throwing new light on the actual mechanism f graft unions.

241. HAVAS, L. J. 577.15.04
Responses of seedlings to animal embryonal extracts.
Nature, 1946, **157**: 728, bibl. 8.
study has been made of the response of radish seedlings) Corhormone, an extract from the heart of embryos, and) the embryonal extract alone after the hormone has been olated. While some stimulation was brought about by ie extract alone, the effect was very marked in the Cor-)rmone-treated plants. A preliminary cytological exam- ation of the latter suggested a myxoploid tissue. The)nclusion is drawn from these and other effects noted in ore detail that (1) the reaction of plants to carcinogenic id polyploidizing agents is largely independent of the emical structure of the drug and (2) these seedlings may be ed as pharmacological test objects.—Hungarian College Horticulture, Budapest.

242. VAN DER LEK, H. A. A. 577.15.04
Toepassingen van synthetische groeistoffen. **(The application of synthetic growth substances.)**
Reprinted from *Nederl. Boschb. Tijdschr.*, 1943, 31 pp., bibl. 21, being *Overdr. Lab. Tuinbouw-Plteelt*, No. **28**.
is address, delivered at a scientific forestry course at ageningen in October, 1942, is a historical survey of the e of growth substances in plant life, with special reference their value in inducing rooting in horticultural plants. me of the author's own work on the rooting of cuttings described and illustrated.

243. CHOUARD, P. 612.014.44
Sur le rôle respectif de l'obscurité et de la lumière dans les phénomènes du photopériodisme. **(The respective functions of darkness and light in photoperiodism.)**
Reprinted from *C.R. Acad. Sci. Paris*, 1944, **219**: 469-70, bibl. 5.
e author challenges the view that all plants, including g-day plants, require some darkness, at least during the ial stages of their development. Wheat, corn salad and den cress were sown on the top of flower pots and were tinually illuminated, at night with a 200 lux incan- cent lamp. Flower and seed development was normal, ugh delayed by 2-3 days and 10-15 days, as compared h the controls, in the case of garden cress and wheat pectively.

1244. LUNDEGÅRDH, H. 581.11
Transport of water and salts through plant tissues.
Nature, 1946, **157**: 575-7, bibl. 9.
The movement of water and salts in plants is discussed with illustrations under the headings: absorption of ions in the surface of the protoplasm, accumulation and transport of cations and of anions, sap movement and bleeding. The author concludes: "The high hydrostatic force developed in the absorption zone of the roots is a guarantee for the supplying of the aerial parts of the plant with nutrient salts. Guttation from leaves during inhibited transpiration is the visible sign of the high internal pressure. Transpiration accelerates the movement of the sap and augments the quantity of water transported. But the quantities of nutrient salts passively sucked through the living root tissue are very limited in comparison to the accumulation due to respiration."

1245. HUNZIKER, A. T. 581.144.2
Raices gemiferas en algunas plantas leñosas argentinas. **(Bud-bearing roots on certain woody plants in Argentina.)**
Rev. argent. Agron., 1946, **13**: 47-54, bibl. 6.
Describes 17 woody plants growing in Argentina that produce buds on their roots. Some produce the buds spontaneously and readily develop suckers, others only after injury. Most of the plants mentioned are found wild in woods and ravines but two are cultivated, viz. *Enterolobium contortisiliquum* (Vell.) Morong, and *Eugenia uniflora* L., the former producing induced, the latter spontaneous root buds.

1246. VALDEYRON, G. 581.162.3
Où en est le problème de la métaxenie ? **(A review of work on metaxenia.)**
Ann. Serv. bot. Tunis., 1941, **18**: 43-55, bibl. 45.
A survey of published results brings the author to the conclusion that the problem is still an open one. It would seem, however, that apart from dates and cotton, most cultivated plants are not affected materially by any action which foreign pollen may have on the mother tissues. So far there has been no work which has definitely determined the exact conditions under which metaxenia occurs, or the mechanism involved or the biological consequences of the phenomenon. These consequences are considerable, since, if it is correct that the embryo can affect the tissues surrounding it, it must be admitted that it brings about this effect by means of secreted substances and in all cases behaves like a grafted tissue. This opens up an immense field of enquiry. The author suggests that in all future experiments (1) the objectives shall be definite, (2) observations shall be checked against sufficiently numerous artificial pollinations, (3) the characters envisaged shall be clear-cut and not ambiguous, (4) the seed resulting shall be studied in the F_1 generation to verify the efficacy of the artificial pollinations made and discover whether the fruits which have shown definite metaxenia contain embryos which possess affected genes.

1247. PULVERTAFT, R. J. V. 581.162.3
Effect of antiseptics on the germination of pollen grains.
Nature, 1946, **157**: 301-2.
Many substances with bacteriostatic properties inhibit the formation of pollen tubes, in concentrations similar to bacteriostatic values. Pollen grains germinate, however, in very high concentrations of penicillin, the effective concentration varying slightly from plant to plant. The technique of testing the action of antiseptics on pollen grains is described.

1248. RAKITIN, J. V. 634.1/3-1.547.6: 581.192
The rate of accumulation of ethyl alcohol and acetaldehyde in ripening fruit. [Russian.]
Biohimija (Biochemistry), 1945, **10**: 373-8.
As soon as fruits with fleshy pericarps stop growing and

begin to ripen, ethyl alcohol and acetaldehyde are formed, and increase in amount as ripening proceeds. This phenomenon was observed in all the following fruits without exception: tomatoes, melons, plums, peaches, apples, pears, lemons, mandarins, and persimmons. It was accompanied by a diminution in the activity of catalase, peroxidase, and gaseous exchange in the tissue; and by an increase in the activity of carboxylase, and in the magnitude of the CO_2/O_2 ratio. During these changes, the intercellular spaces, in which most of the gases of the tissue occur in a free state, diminish in volume, thus reducing the oxygenation of the cell contents, and favouring the accumulation of ethyl alcohol and acetaldehyde.

1249. MIMEUR, J. M. 581.192
Miellées végétales et miellats animaux. **(The sweet excretions of plants and animals.)**
C.R. Acad. Agric. Fr., 1945, **31**: 296-8.

The French terms "miellée" and "miellat" have been used indiscriminately for the sweetish excretions (honeydew), whatever their origin, frequently produced on plants. To avoid confusion it is suggested that "miellée" be used for juices exuded by the plants, and that "miellat" be applied to those excreted by animals (particularly aphids).

Nutrition.

1250. CHOUARD, P. 631.8: 631.4
Nutrition de la plante et nutrition du sol. **(Nutrition of plant and soil.)**
Reprinted from *Cours Conf. Centre Perf. tech.*, June 1942, Fasc. 871, pp. 22, bibl. 15.

Great progress has been made in plant improvement by breeding and in the study of plant nutritional requirements, but the problem of soil improvement has not been quite so effectively tackled. The latter aspect is therefore more throughly dealt with in this lecture given in Paris in June, 1942.

1251. ROACH, W. A., AND BARCLAY, C. 632.19: 631.811.9
Nickel and multiple trace element deficiencies in agricultural crops.
Nature, 1946, **157**: 696, bibl. 3.

Following preliminary diagnostic injections of crops on Romney Marshes, Kent, in 1944, field experiments on a factorial pattern were carried out in 1945. Among the trace elements to give statistically significant and economically important increases in yield were nickel and zinc. This is believed to be the first record of nickel deficiency anywhere and of zinc deficiency in the British Isles. The crops were wheat, potatoes and broad beans.—East Malling Research Station.

1252. NICHOLAS, D. J. D. 632.19: 546.711
Detection of manganese deficiency in plants by tissue tests, using tetramethyldiaminodiphenylmethane.
Nature, 1946, **157**: 696, bibl. 7.

This sensitive method, evolved at Long Ashton, has so far been tested on cereal crops only. The sensitivity range, from 100 to 1 part per 1,000 million, should, it is thought, be adequate for most crops.

1253. DELF, E. M. 581.192: 546.56
Translocation of copper ions in plants.
Nature, 1946, **157**: 666-8, bibl. 4.

The translocation of copper ions was studied in a number of woody and herbaceous plants and algae by applying a mixture of copper sulphate, calcium chlorate and ordinary soil to a shoot, ring-barked near its base, and placing freshly cut sections in a solution of potassium ferrocyanide some time after the treatment. A few of the results obtained are tabulated, showing, for instance, that in *Impatiens glandulifera* the rate of upward movement in the phloem under certain weather conditions was 3-4 cm. per minut The method is thought to be applicable to translocatio studies of other ions.

1254. ŠESTAKOV, A. G. 581.132.8: 631.811
The influence of potassium, sodium and calcium on the carbohydrate metabolism of plants. [Russian.]
Proc. Sci. Conf. Timirjazev agric. Acad. 6-13 Dec. 1944, 1945, No. 2, pp. 113-5.

Sunflowers were grown in nutrient solutions which include various quantities of K and Na. Some of the plants we put into gypsum solution for several hours daily, the othe into a solution containing gypsum and carbohydrate The carbohydrate content of the plants in the latter grou was a little greater than of those in the former, but the tot yields scarcely differed. Sunflowers grown in sand we given nutrient solutions containing compounds of K, N and Ca in various combinations. It was found that t cations differed in their influence in promoting either t synthetic or hydrolytic action of invertase in the leave The total amount of soluble sugars in the leaves was larg as a result of the influence of Ca than of K or Na.

1255. PETERBURGSKIĬ, A. V. 581.11
The absorption of aluminium by plants. [Russian.]
Proc. sci. Conf. Timirjazev agric. Acad. 6-13 Dec. 1944, 1945, No. 2, pp. 116-9.

The purpose of the experiments with peas, spring whe barley, oats, flax, lupins, and buckwheat was to discov why some species of these crop plants are more sensitive the toxic effects of aluminium absorbed by their roots th are others. It is concluded that those species, such as pe which retain most of the aluminium ions in the roots, r allowing them to reach the leaves in significant amoun suffer less from aluminium poisoning than do those, su as flax, through which the ions pass more readily. T presence of Ca ions in the nutrient solution increased t absorption of Al ions, but the very mobile ions hindered No demonstrable connexion was found to exist between t quantity of Al absorbed and the absorbing area of t root surface.

1256. BERTRAND, G., AND BERTRAND, D. 581.192: 546.35
Présence générale du rubidium chez les végétaux. **(Rubidium present in plants.)**
C.R. Acad. Agric. Fr., 1945, **31**: 100-1.

Sixty plants or parts of plants belonging to 52 differ species were tested and rubidium was found in all. T species were of varied origin and from various families the plant kingdom; they were mostly terrestrial plan but included also marine flowering plants and seawee a mould (*Aspergillus*) and yeast, and certain paras flowering plants.

Technique.

1257. PIROVANO, A. 634.1/8-1.523: 631.588.1
Progress and directives regarding electrogenetics.*
Mon. Bull. agric. Sci. Pract. Rome, 1945, **36**: 173T-89T, bibl. 20.

Results discussed in this article indicate the possibility making appreciable advance by electrogenetic metho using alternating, rotating and constant polarity magn fields and fixed and rotating electric fields. The aut who has been working on the subject for many years at station near Rome, examines briefly the methods used the physiological effects on the seed, discusses in detail r variations brought about and makes practical suggestio The particular plants chiefly discussed here are maize *Hippeastrum vittatum*. As regards fruit and vegetables notes striking results obtained by treatment of vine pol

* See also *H.A.*, 2: 315, 7: 19 and 10: 520.

the strains obtained not only has there been a greater
oportion of choice varieties but also marked changes in
vour: thus rose flavour and other particularly fragrant
omas have appeared in muscats. Orange and vivid red
apes have been evolved. He notes that the most successful
ie strain yet produced by him is a fairly early, stoneless
ole grape variety with large berries, which when fully
ature contain 28% glucose and bronze well in the sun.
rther, small-stoned peaches of particularly sweetly
rfumed, juicy fruit have been evolved and some of these
ve shown some resistance to spring frost damage.
eresting results are also reported with squashes, *Cucurbita*
xima.

58. GAVAUDAN, P. 576.312.35
Les substances provoquant la polyploïdie expérimentale, leur mécanisme d'action et les problèmes biologiques qu'elles soulèvent. **(Substances which induce polyploidy, their mode of action and the biological problems raised by them.)**
Fruits d'outre mer, 1945, **1**: 4-9.

e author traces the progress of work on induced poly-
oidy in plants from that of Nemec in 1905 via the discovery
the properties of colchicine by Dixon and Malden, 1906,
vaudan's work on the production of polyploid cells
Blakeslee's production of polyploid plants in 1937.
ench and Russian work on other promising substances
n became important, and Ferguson with his theory
thermodynamic activity opened the road to further
vance. His theory with regard to mito-inhibiting
ostances has produced order in this extremely hetero-
neous group of substances. A certain resemblance can
seen between mito-inhibiting substances and cancer-
oducing substances in their production of anomalies in
ryokinesis, but the great difference between the two types
substances is that, whereas the growth induced by
ncerization continues, the tissues submitted to mito-
nibiting substances resume their normal method of
ltiplication. [This account would be even more valuable
he author cited not only the relevant authorities, as he
es, but also their relevant publications, which he does not.]

59. CHOUARD, P. 581.143.26.03
Théorie et pratique de la vernalisation. **(Theory and practice of vernalization.)**
Rev. Agric. France, 1943, **75**: 37-8, 54-5.
rnalization may find some limited application in French
rticulture, for instance with certain subtropical fruits,
ize and soja bean.

60. NEERGAARD, P.
612.014.44: 631.531.17+632.4
Lysbehandlings Indflydelse paa Levetiden hos Frø og Svampesporer. **(The influences of light treatment on the longevity of seeds and fungus spores.)**
Reprinted from *Gart.-Tid.*, 1941, Nr. 28, pp. 4, bibl. 7.
spring 1933, several lots of cauliflower and cabbage seed
the 1932 crop were exposed for one hour to simultaneous
umination by a mercury-quartz lamp and a Hanau
llux lamp. In January, 1941, the germination capacity
treated and untreated cauliflower seed both stored in
ppered glass bottles was as follows: After 3 days, treated
%, control 6%; after 10 days, 80% and 44%; abnormal
rmination after 10 days 4% and 8% respectively. The
rresponding figures for cabbage seed are 81% and 37%,
% and 70%, 2% and 3%. An evaluation of the germina-
n capacity of *Alternaria circinans* and bacterial spores
ached to the seeds led to the observation that light
eatment prolongs the life of fungus spores, while it shortens
at of bacterial spores. In 1937, 7% of the treated cauli-
wer seed stored in glass bottles with sealed stopper were
fected with *Alternaria*, as against nil in the controls. On
the other hand, in 1941, 1·9% of light-treated cauliflower seed showed bacterial infection as compared with 12·6% in the controls. These preliminary results open up perspectives for further investigations, but it is clear already that light treatment of seed in order to increase longevity must be preceded by the removal of fungus spores.

1261. EGGERT, R. 581.12: 578.088.6
The construction and installation of thermocouples for biological research.
J. agric. Res., 1946, **72**: 341-55, bibl. 11.
The thermocouple, when connected with a potentiometer, has several advantages over other instruments used to determine temperature changes in biological material; any temperature within its range may be determined instantly, and its small size permits measurement of temperatures in localized areas of living or dead tissue. A method is described for inserting thermocouples in tree trunks. They should be installed in the cambium of trees in a position parallel with the length of trunk or limb, to insure more accurate readings of temperatures on any one side of the tree.

1262. ORIOL I ANGUERA, A., AND ANGEL I AYMERICH, J. 631.417.2
Un aparell per a dosar l'humus. **(An apparatus for estimating humus.)** [English summary.]
Arxius Inst. Cienc. Barcelona, 1936, **2**: 295-303.
[Received May, 1946.]
The authors describe and illustrate a new apparatus for volumetrically estimating humus in soil, allowing of direct reading on a scale.

1263. HENIN, S., AND OTHERS. 631.432
Méthode simple pour la détermination de l'humidité du sol. **(A simple method of determining soil moisture.)**
C.R. Acad. Agric. Fr., 1945, **31**: 412-3.
This is a simplification of the technique described by Bouyoucos in *Soil Science*, 1931, 32: 173.

1264. BONILLA ARGUEDAS, G. 633.73-1.875
Ensayos del procedimiento Indore modificado. **(A modified Indore process.)**
Rev. Inst. Def. Café Costa Rica, 1945, **15**: 102-14, 176-87, 282-7.
The author gives a general account of the value of humus in the soil and describes his method of preparing it. His conclusions are: Town and country refuse can be converted with little cost into something better than ashes. To avoid the loss of nitrogen, gypsum should be used in the early period of decomposition; neither ashes nor calcium carbonate are to be recommended. The gypsum transforms the volatile ammonium carbonate into the more stable sulphate of ammonia. To avoid the leaching of soluble phosphorus and potassium compounds an absorbent layer should be placed in the pile, such as sawdust, moss, dry wool, straw, etc. The quantity of water added should be carefully controlled. The ideal temperature is between 35° and 45° C.

1265. HASELAR, R. E. 631.459
Soil conservation and erosion prevention.
Qd agric. J., 1946, **62**: 69-73.
Discusses the value of vegetative cover, terracing and contour farming in preventing soil erosion.

Noted.

1266. ANON. 633/635
a **The John Innes Horticultural Institution.**
Reprint from *Nature*, 1945, **156**: 586.
A brief account of its foundation, work and proposed move to Bayfordbury.

b BETTS, E. M. 635.9
Jefferson's gardens at Monticello.
Reprinted from *Agric. History*, 1945, **19**: 180-2, bibl. 2.

c BRAND, D. D. 581.9(7/8)
The origin and early distribution of New World cultivated plants.
Reprinted from *Agric. History*, 1939, **13**: 109-17.

d EDWARDS, E. E. 63(73)
Jefferson and agriculture. A source book.
Agric. Hist. Ser. U.S. Dep. Agric. **7**, 1943, pp. 92, bibl. 31 (mimeographed).

e MICHEL, R. 631.423
Analyses agronomiques comparatives. Méthodes pour cases lysimétriques. **(Comparative analysis [of N, P and K] in lysimeters.)**
Ann. Serv. bot. Tunis., 1941, **18**: 257-316, bibl. 46.

f BELTRAN, E., AND LEROY, R. 612.014.423
Propriétés diélectriques des végétaux. **(Dielectric properties of plant materials.)**
Ann. Inst. agric. Algér., 1942, **1**: 2: 135-51.

TREE FRUITS, DECIDUOUS.

General.

1267. RIERA, F. X. 582: 41.312.1
Contribucio al " Code for Pomological Nomenclature ".* **(Contribution to the Pomological Nomenclature Code** [as recommended by the International Committee of Horticultural Nomenclature at the International Horticultural Conferences].)
(i) †Els caràcters morfològics en pomologia. **(Morphological characters in pomology.)** (ii) Els caràcters botànics en pomologia. **(Botanical characters in pomology.)** (iii) Caracterització superficial i pigmentària dal fruits. **(The external characters and pigmentation of fruits.)** (iv) Classificació i catalogació en pomològica. **(Classification and cataloguing in pomology.)** (v) Sistemàtica pomològica. **(Systematic pomology.)** [Summaries in Spanish, English, French, Italian, Portuguese and German.]
Arxius Inst. cienc. Barcelona, 1936, **2**: 431-52, 589-615; 1937, **3**: 301-18, 646-74; 1938, **4**: 3-13. [Received May, 1946.]

(i) Comments are made on the diverse standards or tests used in classification and the taxonomic value of the shape of the fruits (apples and pears) is then established as an element of characterization of the diverse pomological families or classes cultivated in Catalonia.
(ii) The author defines all those characters easy of observation which the four floral verticils—sepals, petals, stamens, carpels—acquire in the ripe fruit and characterizes the shapes and dispositions with which they present themselves in consequence of the development of the floral receptacle in the fleshy tissue, which gives rise to the complex fruit or pome. The points raised are illustrated in six folding plates.
(iii) The nature of the skin or epicarp of fruit and its relief constitute superficial characters; colour, dots and russet are pigmentary characters. The author's studies of these characters in relation to their taxonomic value are described and illustrated in four folding plates.
(iv) The necessity of bringing together into natural groups or pomological families the different varieties of fruit cultivated is pointed out, and the importance is stressed of doing so in accordance with their relationship or analogy instead of with local circumstances such as time of ripening, fitness for consumption, etc. A distinction is made between classification (the grouping of categories according to a botanical system) and cataloguing (listing according to a previously established order of fruit characters within a local area).
(v) This is a plea for the unification of synonymic and descriptive nomenclature, based on the general directions laid down in the " Code of Pomological Nomenclature ", and for precision in the use of pomological terms.

1268. NILSSON, F. 634.1/7(48.5)
Prospects for fruit-growing in Sweden.
Quart. Rev. Skandinav. Banken statist. Dep., 1946, **27**: 16-22.

Swedish statistics show a very rapid increase in the number of fruit trees in the nineteen-twenties and thirties followed by a great reduction due to the severe winters of 1939-1942. The greatest damage was sustained by plums and pears, but cherries and apples also suffered, whereas small fruits were not so seriously affected. The apple is much the most important fruit species grown in Sweden and the value of the apple trees now growing is nearly twice that of all other fruits put together. The Province of Skåne boasts the greatest number of apple and pear trees, while no less than 15% of all the cherries grown are in the County of Skarabord in Västergötland. Figures published by the Swedish Pomological Society for 1941-1944 for a large number of fruit farms in different parts of the country show an average crop for these four years of 20·5 kg. apples, 17·2 kg. pears, 9·3 kg. plums and 6·9 kg. cherries per tree. The tendency is towards increased specialization. The chief small fruits are, above all, red and black currants followed by gooseberries, raspberries and strawberries. In 1941 an association was started by Swedish fruitgrowers for the breeding of fruit trees and in 1942 a property was bought for that purpose near Kristianastad. Breeding is now in full swing. The State Horticultural Research Station [at Alnarp, Åkarp] has now organized the scientific testing of varieties at different places. The primary aim as regards apples is the production of late ripening, good keeping varieties. Work on the triploid types, e.g. Gravenstein, Belle de Boskoop, Reinette du Canada, Ribston and Järnäpple, has produced several tetraploid plants in the progeny of these varieties except in that of Gravenstein. Crossing the tetraploids themselves with diploids has produced several thousand new triploids. Inter-crossing the tetraploids has also led to a large number of new plants with the same high tetraploid number. By selection from the above material it should be possible to raise types of satisfactory hardiness and high yield of fruit of high keeping quality. The crossing of diploids is also being undertaken, special attention being paid to the improvement of Cox's Orange Pippin, Cox's Pomona, Åkerö, Wealthy, Boiken and McIntosh. Work on the breeding of suitable rootstocks has also been started, the chief aim being the production of hardy stocks, which will give rise to small trees coming into bearing early and needing little attention. The aim of the pear breeder is high quality winter pears of good keeping capacity. Thus the first crosses have been made between Johantorp, a highly fertile and good keeping variety, with Doyenné de Comice. Work on pear stocks concerns seedling pears and quinces, the difficulty with quinces being that they are only winter-hardy in the southern parts of Sweden. The aim in breeding the other top fruits is much the same, i.e. a combination of quality of fruit and winter hardiness of tree. The small fruits are also receiving attention. Of gooseberries the variety Scania shows great promise as a parent, being disease-resistant and hardy. Red currants are very hardy and grow all over the country. The blacks are not hardy enough for the north but wild types are available there as possible parents. Incidentally certain high chromosome types of *Ribes* [the normal chromosome number is only 16] of potential breeding value have been produced at Alnarp. As regards raspberries, promising types have resulted from crosses of Pynes Royal and Marlborough. Among strawberries the American variety Southland when grown in Sweden is superior to all others in yield. It is being crossed with the Swedish variety Inga produced at Alnarp and great

* See also *H.A.*, 10: 21, 478, 1293.
† (i), (ii) numbers inserted by Editor of *H.A.*

es are set on the results. Fruit statistics for 1943 showed the number of fruit trees in Sweden was then 8·2 million, million of these being over 5 years old including 4·17 ion apple, 0·90 million pear, 0·73 million plum and 3 million cherry trees. Currant bushes totalled 3·70 ion and gooseberries 2·23 million. In addition 3,700 s were under strawberries and 2,500 under raspberries.

). MEYER, A. 634.1/8(494)
Neue Probleme im Obstbau. (**New problems for Swiss fruit growers.**)
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 121-9.
tatistical survey of fruit production, fruit utilization and t imports in pre-war Switzerland. The new situation uires production of quality fruit at reasonable prices for home market and possibly for export. The greater care n to fruit trees has led and will continue to lead to eased yields, so that in future a harvest of one million of pome fruits will probably be regarded as normal. problem will be how to dispose of the 100,000-200,000 in excess of maximum home requirements.

). REBOUR, —. 634.1/8(61/64)
La situation économique des principales productions fruitières de l'Afrique du Nord. (**The economics of fruit production in North Africa.**)
C.R. Acad. Agric. Fr., 1946, **32**: 355-6.
rief review of the possibilities of economically extending cultivation of fruit in N. Africa. First in importance e citrus, almonds, olives, figs, and Japanese prunes. er fruits that it might pay to grow for export are grapes, opean plums and apricots. The date palm is in a class rt, since its extension depends on a supply of water, ch at present is very limited. Of fruits that could be vn for the home market are mentioned peach, pear, le, medlar and carob, and, on a smaller scale, quince, negranate and Barbary fig. Of doubtful value for her development are pecan and pistachio nuts.

. GUILLEMET, P. 634.1/8(64)
Les possibilités de l'Empire Chérifien en cultures fruitiers. (**The possibility of growing fruit in Morocco.**)
C.R. Acad. Agric. Fr., 1945, **31**: 304-6.
orth Morocco there is a large forest (Mâmora) con- ng mostly of cork oak, but with about 5% of an endemic ies of pear (*Pirus mamorensis* Trab.). The fruits of e pears are very astringent, but they are eaten by the es living in the forest. The author recommends that e wild pear trees, numbering about 2 million, should be vn-grafted or framework-grafted with commercial eties, the scion wood to be provided and distributed by Societé Pomologique de France. Crown grafting ied out in spring 1941 on old pear trees at the edge of forest has given satisfactory results. The varieties used cions were Doyenné de Juillet, André Desportes, Beurré ard, Wilder and Clapp's Favourite. Only early eties, such as those mentioned, are recommended, for s that ripen after 10-15 July are invariably attacked by Mediterranean fruit fly (*Ceratitis capitata*).

2. DUMONT, H., AND VALDEYRON, G. 634.1/2(611)
Le verger d'essais de Sbeitla. (**The Sbeitla trial orchard in Tunisia.**)
Ann. Serv. bot. Tunis., 1941, **18**: 3-40, bibl. 3.
trial orchard at Sbeitla was started by Rebour in 1928 was fairly fully planted up by 1933. In 1937 it was n over by the Botanical Service of the country. It sists of some 5 hectares and lies at an altitude of 560 m. is under irrigation. Wind protection is necessarily n. The average temperature varies from 7° C. in winter 6° C. in July, minimum and maximum noted in recent s being —7° C. and +41° C. in 1937. Notes are given arietal performance of the following:—apricots, peaches, ns, almonds, apples, pears, cherries. It may be noted that the apricots worked on seedling apricot have done very much better than the rest worked on almond rootstocks. The same applies to peach varieties on their own roots compared with those on almond roots. Both Japanese and European plums form part of the collection and in this orchard, at any rate, almond appears to provide a satisfactory rootstock for plums. Almonds have their own rootstock problem. At Sbeitla seedling almonds provide the rootstocks but the result is not entirely satisfactory. Results of trials to date with myrobalan, apricot, peach and *Prunus davidiana* have been inconclusive. Apples are worked on Doucin. Seedling pears are used as rootstocks for pears, quinces having shown insufficient vigour. Cherries unlike the other species concerned proved unable to stand up to a year's neglect in 1939-1940 and many trees died.

1273. REBOUR, H. 634/635: 664.84/85
Variétés de fruits et légumes à cultiver pour la conservation. (**Fruit and vegetable varieties for preserving.**)
Tunis. agric., 1941, **42**: 56-63.
Sun drying is only practicable in the south of Tunisia. While noting the varieties of apricot, grape, fig, plum, peach, pear and apple which are found suitable for drying elsewhere, particularly in California, the author makes but few specific recommendations with regard to Tunisian varieties. He also discusses Tunisian fruits suitable for preservation in syrup, chief among these being apricots, peaches, plums, cherries and possibly figs. Preserved vegetables include globe artichoke, asparagus, beans, peas and tomatoes. Shorter notes are given on preservation by the use of antiseptics and by cold.

Varieties and cultivation.

1274. CRANE, H. H. 634.11-1.521
Some good American apples.
J. roy. hort. Soc., 1946, **71**: 172-3.
The following American apple varieties are named as suitable for growing in private gardens in southern England: American Mother, Delicious, King of Tomkin's County, Ontario, Wealthy and Wagener. Their merits are discussed.

1275. TARASENKO, G. G. 634.12
The crab apple (*Malus prunifolia* Borkh.), and its origin. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), No. 3, 1940, pp. 31-8.
After a study of many existing specimens of *M. prunifolia*, the author succeeded in producing examples of this species by crossing as follows: (*M. baccata*×*M. domestica*)×*M. domestica*. Its origin being thus demonstrated, *M. prunifolia* is expected to prove of even greater practical value than hitherto in the production of stocks which, supplemented by hybridization with southern apple varieties, will enable the cultivation of apples to be extended northwards.

1276. FLOOR, J. 634.11(42)
De appelteelt in Engeland. (**Apple growing in England.**)
Meded. Direct. Tuinb., 1946, pp. 393-401.
The author gives his personal impressions of apple growing in England. After a general introduction in which reference is made to size and lay-out of apple orchards in England, he discusses apple growing under (1) varieties, (2) rootstocks, (3) type of tree (standards, half-standards, and bush trees), (4) pollination (pollinating varieties), (5) manuring and cultivation, (6) dwarf pyramids.

1277. SOUTHWICK, L., FRENCH, A. P., AND ROBERTS, O. C. 634.13-1.521
The identification of pear varieties from non-bearing trees.
Bull. Mass. agric. Exp. Stat. **421**, *Suppl.*, 1945, pp. 2.
For an abstract of Bulletin 421 see *H.A.*, 15: 981. The supplement substitutes a new description of the Waite

variety for that erroneously given. Some minor errata are also corrected.

1278. DEGMAN, E. S. 634.13
Anjou pear growing on heavy soils in the Medford, Oregon, area.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 139-42.
In the Medford area the Anjou pear is grown, to a large extent, on very heavy, compact, and poorly aerated soil in which there is only a small quantity of air, and after irrigation the percentage of oxygen present is quickly reduced to near zero. During irrigation (by the rill method) the surface dry clods quickly slake down and give the appearance of thorough irrigation, but penetration is very slow and during summer the trees may remove water from the soil at a faster rate than can be applied to the lower depths. The condition can be partly alleviated by sowing cover crops. Light pruning of Anjou is as effective as heavy pruning when soil moisture is adequate. On the heavy soil, in years when cork is prevalent, heavy pruning makes it worse. The only element deficient in the area is nitrogen. Because of the tendency of ammonium sulphate to make the soil acid, care must be used in applying this fertilizer.

1279. RUBČOV, G. A. 634.13-2.111
The cultivation and improvement of pear varieties in the province of Leningrad. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 13-21.
During the severe winter of 1939-1940, many pear trees in the Leningrad area perished, so that replanting, preferably with early ripeners, is now necessary. The hardiness and other merits of the varieties which survived the winter are discussed by the author with a view to utilizing them for replanting, and for extending the cultivation of pears in the Province. Of the existing varieties, Tonkovetka, Bessemjanka ("Seedless"), Limonnaja, and Bergamotte Volžskaja proved to be the hardiest. Others which it is desirable to propagate are Beurre Koklovskaja, Dočj Blankovoï, Russkii Esperen, Beurre Oktjabrjskaja and Beurre Kimnjaja. Though the present Mičurin varieties are not fully adapted to Leningrad, crossing them with southern pears for quality, and with northern and Ussuri pears for hardiness, should result in suitable varieties. Several varieties of such a kind are being produced, of which Krasnopaharjskaja (Ušakova) is one of the best. The most satisfactory stocks have proved to be *P. communis*, the Ussuri pear, and certain specimens from the region of the lower Volga, Kursk, and Voronež.

1280. INGRAM, C. 635.976.32: 634.23
A revised classification of the deciduous cherries.
Gdnrs' Chron., 1946, **119**: 196-7, 218.
The chief change from Koehne's classification (*Plantae Wilsoniae*, 1912) of the genus *Prunus* is the division of the sub-genus *Cerasus* into two, so as to form an additional sub-genus, *Lithocerasus* Ingram for the rock and bush cherries, typified, respectively, by *Prunus prostrata* Labil. and *P. glandulosa* Thunberg. On p. 218 the author corrects a few typographical errors.

1281. TETEREV, F. K. 634.23-2.111
Mičurin varieties of sour and sweet cherries in the Leningrad province. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 17-20.
Of the 30 or more new varieties of cherry produced by Mičurin, only three are frequently met with in the Leningrad province. Specimens of these three, growing at the experimental station, Krasnyč Paharj, of the Inst. of Plant Industry, have been observed for eight years and are here described. They are Ideal Mičurina, Plodorodnaja Mičurina and Krasa Severa. Kozlovskaja Mičurina, another of Mičurin's varieties, which has nowhere in his writings been referred to, is also described. All these varieties a cold-resistant.

1282. FLORY, S. J. 634.25-1.521
Meeting the peach variety problem.
Proc. 60th Conf. Amer. pomol. Soc., Dec. 1944, pp. 123-6.
Elbertas constitute 68% of all peach trees in Virginia. Not are given here on a few of the new outstanding varieti which have resulted from breeding work at the experime stations of New Jersey, Michigan (South Haven), U.S. De Agriculture (Fort Valley, Georgia), Maryland, and Ontar (Vineland). Work in progress since 1926 at the Virgin Station is also reviewed. Here the main object is t production of a peach of the Elberta type possessing t shipping and keeping qualities of the Elberta, equal vigo and resistance to brown rot and other diseases and addition better quality flesh, greater hardiness and earli maturity.

1283. MARTINOLI, L. 634.25
Einige Erfahrungen aus dem Pfirsichanbau des Kanton Tessin. **(Peach growing in the Canton of Ticino.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 193-7.
The Swiss Canton of Ticino is so well suited to peach growi that large harvests have been obtained without any ca being bestowed on the trees, the majority of which a unworked seedlings, many of them not even planted. accordance with the general trend to improve fruit quali however, a small experimental orchard has been establish at Camarino near Bellinzona, from where the followi observations are reported: (1) Peach seedlings are the b rootstocks for growing trees in the open. (2) The disea resistant Elberta variety has given excellent results, but a the early Mayflower may be recommended, if conscie tiously sprayed. (3) The Oeschberg method of pruning h been very successfully adapted to peach. A hollow cro is aimed at with 4, and in exceptional cases 5 limbs, whi are encouraged to develop fruiting wood in their lower par The limbs are not allowed to branch. This method pruning, carried out either at blossom time or in the seco half of June, was found to be the only one favouring fai vigorous growth in the bottom half of the crown. Heig of the stem is 80 cm. to allow for mechanical cultivatio (4) Winter spraying is done with dinitro-cresol or carb lineum, the latter at a lower concentration than is norm for pome fruit. Copper-containing sprays are used agai fungus diseases. (5) The sandy soil requires stable manu to which a complete fertilizer should be added in the case prolific trees. Regular cultivation, especially in summ is beneficial, and irrigation proved to be a great advanta (average annual rainfall 1,500 mm.).

1284. MORETTINI, A. 634.451
La coltura del diospiro o kaki. **(The cultivation of kaki.)**
Ital. agric., 1946, **83**: 155-61.
The author foresees a great future for the cultivation of t fruit species in Italy. It has so far proved almost immu to the common pests and diseases of other fruit trees Italy. It ripens in October to December when fruit otherwise inclined to be scarce. Most of the climates a soils of Italy suit it and when given reasonable care it yie regularly and well. Roughly, varieties can be placed in t groups according to whether the fruit is immediately edi on picking, e.g. Kaki mela = Kaki vainiglia in Italy, Hyacur Fuyugaki and others in U.S.A., or whether the fruit initially very full of tannin and astringent to the taste ur some time after picking. This second group is also su divided according to the nature of the fruit pulp, whet granular or fleshy. Amankaki in Italy, Tane-nashi a Triumph in U.S.A. and others belong to the fleshy sub-gro of the second group. In Italy seedling *Diospyros lotus* used as rootstock. The seeds are taken and stratified

l in October and sown the following March. The ng seedlings are planted in the nursery a year later, but rther year elapses before they are budded. In the autumn ie year of budding or the following spring the young kaki be planted out. Trees are planted 5 to 8 metres apart are pruned to a vase shape. They will begin fruiting in 4 years, the average annual crop for a 8-9-year-old tree g about half a quintal [or about 1 cwt.] and for a 0-year-old tree 1 quintal or more. Introduction and ction are necessary as also work on processing.

5. VALDEYRON, G. 634.63: 581.192
Dosage de l'huile dans les olives. **(The determination of oil in olives.)**
Ann. Serv. bot. Tunis., 1941, **18**: 59-66, bibl. 3.
ls in 1938 showed the existence of a very pronounced ation in oil content as between different olives on the e tree. Analysis of 100 olives from one tree showed that oil amounted to 28·5% of the fresh weight with a dard deviation of ±5·7.

5. KRUPENIKOV, I. A. 587.34: 631.415.3
On the calciphily and salt resistance of *Crataegus sanguinea* Pall. [Russian.]
J. bot. U.R.S.S., 1945, **30**: 265-8.
dry conditions and saline soils of central and northern Kazahstan preclude the cultivation of most orchard s, even if irrigation were practicable. Although *anguinea* is not adapted to withstand drought it is rtheless able to survive and even flourish in moist soils, if these contain as much as 1% of SO_4, and nearly % of Cl. It suffered no harm in the presence of 50% of O_3. The fruits are very abundant, and their flavour is ribed as "not bad", being good enough for the ıexacting tastes" of the local inhabitants. The flavour ıe fruit is improved by a touch of frost. The hawthorn so decorative and can grow to a height of 4 metres.

Rootstocks and propagation.

. SWARBRICK, T., BLAIR, D., AND SINGH, S. 634.1/2-1.541.11-1.541.12
Studies in the physiology of rootstock and scion relationships.
J. Pomol., 1946, **22**: 51-61, bibl. 9.
ıg as scions the varieties Worcester Pearmain and nley's Seedling the experimental trees were built up on ellaneous seedlings, on three clonal rootstocks (Malling IX, II, XIII), and on miscellaneous seedlings with mediate stem pieces of the three clonal rootstocks. trees with intermediate stem pieces of M. IX differed lmost every respect from those with intermediate stem es of M. II and M. XIII, but were similar to trees ked on M. IX in the normal manner. The effect of ntermediate stem piece was more pronounced on root lopment than on top growth. Qualitative as well as ıtitative effects were shown. The roots of trees with mediate stem pieces of M. IX resembled in some ways roots of M. IX. Of the three interpolated rootstock pieces, those of M. IX had the same cross-sectional as the intermediate stem pieces of M. II, yet the trees he latter were twice as large as those of the former. ain characteristic differences such as leaf poise, general t of branching and leaf coloration were shown by the with different intermediate stem pieces. Where M. IX the intermediate stem piece, the upper unions were rged and structurally weak whereas the lower unions not swollen and were structurally strong. The mulated evidence suggests that reciprocal graft unions ıot necessarily behave alike. One variety may serve e well as an intermediate stem piece to another, but the r may not serve as a satisfactory intermediate stem piece he former. The chief practical advantages of the stocks M. IX, II and XIII can be obtained by a double- king method, using miscellaneous seedlings as the absorbing root systems. [From authors' summary.]—Long Ashton Research Station.

1288. VAN HIELE, T. 631.541.11: 634.11+634.13
Over den invloed van den onderstam op de houdbaarheid van fruit 1943/44. **(The influence of the rootstock on the keeping qualities of fruit.)**
Meded. Direct. Tuinb., 1946, pp. 418-39.
The results of the experiments described with apples and pears are inconsistent. From the more or less contradictory results obtained from the different varieties it can be assumed that time of picking plays a very important part in the storage life of apples, but no general conclusion can be drawn as to the effect of the various rootstocks used. On the whole the preliminary impression is that M. I, II and XIII have a favourable effect, M. IV not so good.

1289. SMEETS, B. 634.11-1.541.11
East Malling IV. **(Apple rootstock E.M. IV.)**
Fruitteelt, 1946, Jg. 36, p. 89.
The author asserts that this undoubtedly good rootstock has one great fault. Its union with the scion leaves much to be desired, and the rooting is onesided. In 1936 Malling No. IV rootstocks were grafted at Nieuwstad, Holland, with the varieties Yellow Transparent, Cox's Orange Pippin, Goudreinette, and Jonathan. The trees grew so vigorously that they became topheavy and in the autumn of 1940 some 30% of them were blown down, many of them being broken off at the union.

1290. DROUKIN, I. F. 634.11-1.541.11
Culanovka—a hardy stock for apples in the Leningrad province. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 25-8.
Though slow-growing, Culanovka produces a vigorous and hardy tree. It is easily propagated by root-suckers and by other methods. It roots without difficulty and quickly comes into bearing. When used as a stock it can be budded in August. Its slow growth becomes noticeable at the graft union, but the development of the scion is not impeded, it comes quickly into bearing and is long-lived.

1291. MANN, A. J. 634.11-1.541.11
Framework stocks for apple trees.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 17-9.
Trials in double working apple trees, in order to obtain frameworked trees resistant to winter injury, have been carried out at Summerland Experiment Station, B.C. Of 25 possible framework stocks which have been tested, Hibernal, Virginia Crab, Antonovka and Columbia appear the most promising. The technique employed in training and top-working the young trees is important. The stocks should be large enough to bud in August the second or third year after planting. The buds should be inserted on the branches at least 18 inches, and preferably 2 feet or more, out from the main trunk. Placing the buds at the side rather than on the under or upper surface of the branches encourages new shoots to grow out in the same direction as the original branch. When growth starts the following spring the branches should be cut back close to the inserted bud by a slanting cut. If preferred the top-working can be done by grafting in the early spring, using the whip and tongue graft.

1292. COE, F. M. 634.23-1.541.11
Cherry rootstocks.
Bull. Utah agric. Exp. Stat. **319**, 1945, pp. 43, bibl. 52.
Following a survey of the history of the cherry rootstock problem in the United States and a discussion of the controversial literature on the respective merits of mazzard and mahaleb stocks, the results of 14 years' cherry rootstock trials are reported in detail. These comparative tests of

mazzard, mahaleb and Stockton morello rootstocks for a number of sweet cherry varieties, including Bing, Napoleon and Lambert, were carried out in the orchard of the Experiment Station at Farmington, Utah, one of the cherry-producing States, on a coarse, gravelly, quick-draining loam soil. No details are given of the training of the trees, but the accompanying photographs suggest that the main stem before branching is approximately 2 feet high. The tabulated results leave no doubt that under the conditions of the trial mahaleb proved greatly superior to the two other rootstocks tested, the mean yield of trees of all varieties on mahaleb being over 4 times that of trees on mazzard and 3·49 times that on morello. Comparative data are presented also on trunk circumference and height, spread and volume of top. The calculated volumes of 13-year-old Napoleon tops, for instance, are 2,893, 1,235 and 936 cu. feet on mahaleb, mazzard and morello respectively. Advantages of mahaleb over mazzard, apart from superior vigour and yield, are superior hardiness and higher survival, and over morello better anchorage. While the use of mazzard is discouraged, Stockton morello is thought worth considering as a rootstock for dwarf home garden cherries and for heavier soils. Finally, the need for improvement of cherry rootstocks is emphasized and lines of future research are suggested.

1293. Billbäck, B. 634.1/7-1.537(48.5)
Plantskoleskötsel i kristid. **(Nursery management in Sweden during the emergency.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok 1942, Stockholm, 1943, pp. 92-8.

In certain parts of Sweden frost damage to trees during the winter of 1941-42 was at least as severe as in 1939-40. Northwestern Skåne suffered worst, being hit by the coldest period in January 1942 in the absence of a protective snow cover. As a consequence of the hard winter, hare damage was excessive, although it cannot be assessed in detail. It was observed that hares showed a distinct preference for apple trees and *Cytisus* species. The rootstock position, already difficult owing to export restrictions, became critical. To meet the situation seeds of all fruit kinds were collected in the autumn of 1942 and the raising of seedlings was begun on a large scale. In order to bring the quality of Swedish nursery products to the level of foreign production, specialization and rationalization of management seems indicated. It is suggested that nurseries should be located in the most suitable areas and that they should maintain a small branch near a town for retail trade. In view of the late spring the organization of nursery work presents great difficulties, and countries more fortunately placed cannot serve as a model. It is recommended that part of the nurseries should specialize in raising imported rootstocks and young trees.

1294. Francolini, F. 634.62-1.533
Ancora sulla riproduzione agamica dell'olivo. **(A further note on vegetative propagation of olives.)**
Ital. agric., 1942, **79**: 538-42, bibl. 3.

The author gives numerous examples from Umbria where small plantations of olives grown from ovuli were compared with seedling olives planted at the same time. In all cases the vegetatively raised material showed considerably more resistance to frost and to drought than the seedlings.

Pollination.

1295. Marques de Almeida, C. R. 581.162.3: 634.1/7
Um novo método para o estudo da produtividade das fruteiras. **(A new method of studying the fertility of fruit trees.)**
An. Inst. sup. Agron. Lisboa, 1942, **13**: 99-103.

A description is given of a laboratory method for determining self-fertility, self-sterility and inter-compatibility in fruit trees. It consists essentially in pollinating flowers in the usual way and removing some of the flowers at interv of 24, 48 and 96 hours for detailed examination. T styles are submitted to micro-dissection (to remove t cortical from the conducting tissue of the style) and microscopic examination in order to determine the leng of the pollen tubes.

1296. Marques de Almeida, C. R. 634.13: 581.162.3
A produtividade da pereira Rocha na região da Lourinhã. **(The productivity of the Rocha pear in the Lourinhã district.)**
Reprint *Bol. Junta nac. Frut. Lisboa*, 1943, vol. 3, 22 pp.

The cause of the frequent lack of crop in the pear vari Rocha in the Lourinhã district of Portugal has been stud by selfing and crossing this variety with a number of othe It was shown that the Rocha is practically self-sterile. the field the variety Carapinheira is the variety that present assures the greater percentage of fruit of Roc although laboratory study of the development of the pol tube shows that it is inferior to other varieties. T varieties most suitable for pollinating Rocha are Carap heira, Doyenné du Comice and Beurré Hardy. T advantages and disadvantages of these three varieties discussed. On the whole the author recommends Doyer du Comice for the lower districts, on slight slopes protec from the wind, and on moist soils. In other circumstan Beurré Hardy is to be preferred.

1297. Kobel, F. 581.162.3: 634.1/8
Study on the conditions of fecundation of pomaceous and stone fruit species.
Mon. Bull. agric. Sci. Pract. Rome, 1943, **34**: T398-T407.

This summary was prepared by the author from the natio reports discussed by the Fruit Section of the XIIth Int national Congress of Horticulture, Berlin, 1938, their the being: "The present state of research work regarding conditions of fecundation of fruit species and its appli tion in practice". The author deals with the vari manifestations of sterility as they affect the production fruit and the manner of inheritance of sterility facto dealing in some detail with the interactions of steril factors in apples. He emphasizes the importance of b for ensuring the proper distribution of pollen among fr trees and concludes by stressing the need for contin experiment into pollination and kindred subjects in various countries in which fruit is grown, since varieties a conditions differ and results applicable to one locality variety do not necessarily hold for another. H.M.T

Growth.

1298. Kobel, F. [Burger, H.]. 634.11/13: 581.144
Der Drehwuchs bei Apfel- und Birnbäumen. **(The twisting of stems in apple and pear trees.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 238-40.

The article is a discussion of a paper by Prof. H. Burg Director of the Swiss Forestry Research Station at Züri published in *Schweiz. Z. Forstwesen*, 1946, No. 3. Bur examined over 7,000 apple and pear trees, tabulating results. An extract of his tables shows that in pears 1 of the stems are left-twisters and 70% right-twisters, wh only 19% grow straight, i.e. twist less than 1°. The resp tive figures for apple are 44%, 31% and 25%. With pea the percentage of heavily right-twisted stems, i.e. above increases with diameter from 9% to 53%, while with app the heavy left-twisters increase with age from 2% to 35 From observations of reworked trees, which show differ twisting angles below and above the union, it is conclu that twisting is, at least partly, a varietal character.

Machinery and cultural practice.

99. BIERI, F., AND OTHERS. 634.1/8-1.51
Maschinen und Geräte im Obst-und Weinbau. **(Symposium on machines and tools for fruit growing and viticulture.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 175-91.

he illustrated articles of this special number of the journal e prefaced by H.K[esselring] (pp. 175-6).

(i) BIERI, F.
Werkzeuge für die Baumpflege. **(Tools for fruit tree culture)**, pp. 176-8.
Ladder, saw, secateurs.

(ii) FRITZSCHE, R.
Geräte zur Düngung und Bodenlockerung von Baumbeständen in Wiesland. **(Fertilizing and soil working implements for orchards in sod)**, pp. 178-80.
[For a description of the fertilizer lance see *H.A.*, 15: 1469-71.] Trials showed that it takes 13 minutes to apply 100 litres of fertilizer (10% solution, 1 litre per injection) with one lance, including the time necessary to move the sprayer from tree to tree. If a 3-piston sprayer is available, two lances may be used simultaneously. Another method of applying fertilizer to trees growing in sod is by spade. For every square metre of the area covered by the crown the spade is inserted once in a slanting position. It is then raised to a right angle, while a second man applies two handfuls of fertilizer mixture (=100 g.) into the gap at the back of the spade. When the spade is withdrawn, the sod falls back into position covering the fertilizer. Both methods help to loosen the soil and to promote root aeration. Where the soil is too compact, a special plough has to be used: this is briefly described. The implement cuts the turf and loosens the soil underneath in a fairly wide zone without injuring the turf on top.

(iii) BRYNER, W.
Die Bodenfräse im Baumschul- und Weinbaubetrieb. **(The use of the rotary cultivator in nurseries and vineyards)**, pp. 180-1.

(iv) KESSELRING, H.
Moderne Bodenpflege im Rebbau. **(Modern soil cultivation in vineyards)**, pp. 181-3.
The advantage of horse ploughing and hoeing in vineyards, for which special implements have now been designed, over hand digging and hoeing is emphasized.

(v) KURER, J.
Die mechanische Bodenbearbeitung mit Seilwinden an Steilhängen. **(Mechanical soil cultivation of steep slopes by means of a motor windlass)**, pp. 103-5.
In vineyards situated on steep slopes a motor windlass will pull the plough uphill and will save carrying soil and dung to the top. Several types of windlass are described.

(vi) CONRAD, R.
Unsere Spritzgeräte für die Schädlingsbekämpfung. **(Spraying machines for pest and disease control)**, pp. 185-7.
Includes the illustration of a successful combination of a motor lawn mower with a spraying machine.

(vii) H.H.
Von den Handrebenspritzen. **(Hand sprayers for vines)**, pp. 187-9.

(viii) JENNY, J.
Spritzrohr und Düse in der Schädlingsbekämpfung. **(Spray gun and nozzle in pest and disease control)**, pp. 189-91.

1300. MOBERG, H. A. 634/635: 631.51 + 632.95
Statens maskinprovningar i trädgårdsodlingens tjänst. **(The State machine testing service in the field of horticulture.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942, Stockholm, 1943, pp. 142-5.
The working of the Swedish institute for testing agricultural and horticultural machinery and appliances is described. The institute, Statens Maskinprovningar, has two branches, one at Alnarp, the other at Ultuna in Uppland, where the main offices are. The service offered is not compulsory, but it is to the advantage of manufacturers and salesmen to have an official certificate of the performance of their products. All kinds of agricultural, horticultural and dairy machinery come within the scope of the institute.

1301. KIRSCHLÉGER, M., AND TARDY, R. 631.51: 634/635
Rôle et perspective de la motor-culture dans l'économie rurale Tunisienne. Rapport sur la culture de l'olivier. Rapport sur la culture de la vigne, les cultures fruitières et maraîchères. **(Function and outlook for use of motor power in olive, fruit and vegetable growing in Tunisia.)**
Tunis. agric., 1941, **42**: 65-87.
This article points out the very great advantages which would accrue from the use of motors in Tunisian horticulture—by ill luck at the very time, i.e. 1941, when petrol and fuel oil were beginning to be almost unobtainable there. The possibility of using alternative fuel such as wood or alcohol derived from grapes is just envisaged.

1302. MOORE, L. W. 634.25-1.542.14
Brush and hose thinning of peaches.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 133-7.
A description of successful thinning by two methods. The first consists in jarring the smaller branches a week or 10 days after the first fruit drop, when fruits are about the size of a walnut, with a 15-inch length of old rubber hose mounted on the end of a 5-foot stick. The second method makes use of a wire brush or " whisk broom ". In this the wires of 14-gauge steel bed spring are fastened to a 12-inch wooden handle. There are 12 of these wires, 3 inches long, fastened in a fan shape, which is 4 inches wide at the end of the fan. The wires are held in place by a piece of $\frac{3}{4} \times 2\frac{1}{2}$-inch water pipe which fits over the end of the wooden handle. The wires are evenly spaced in the opposite end of the pipe, which is flattened out to hold them in place. Thinning begins when the petals reach the early balloon stage and may go on a day or two beyond full bloom. The broom is moved with an upward stroke or is brushed along the branch from the base outwards. Every twig is brushed. It was necessary to go back over all the brushed trees and break up the clusters with the rubber hose. The size of the final fruits was very much better after this treatment (i.e. 71% 2 inches and more and the rest $1\frac{3}{4}$ inches unpacked fruit) than after the hose treatment and there was little difference in cost. The whisk broom was also found to be superior to its predecessor, the brush broom.

1303. LÜTHI, E. 634.1/2-1.542
Die Kronenerziehung der Jungbäume. **(Training the top of young fruit trees.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 219-23.
An illustrated description of the Oeschberg method of fruit tree training now generally adopted in Switzerland.

1304. SPRENG, H. 631.542: 634.1/2
Schnitt und Erziehung der Hochstammkrone. **(The pruning and training of standard fruit trees.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 235-8.
Another illustrated exposition of the Oeschberg method of fruit tree training, delivered at a meeting at Wädenswil in April, 1946. Mistakes commonly made are to let the

leader grow weak and to train the limbs at too acute an angle. Both practices tend to have a harmful effect on the development of fruiting wood around the leader. A uniform terminology relating to the different forms of fruiting wood must be generally applied to avoid misunderstanding.

1305. MARSOLAT, R. 634.63-1.542
Taillez vos oliviers. **(Prune your olives.)**
Progr. agric. vitic., 1946, **125**: 164-6, 200-5.
This article discusses in general terms the reasons for pruning olives; only by rational pruning can the best results be achieved, and the neglected appearance of many olive groves is due to lack of pruning. The olive requires air, light, and abundance of heat, and pruning should allow for this. The principal parts of an olive tree are the vigorous upright branches that rarely bear flowers, and the weaker, horizontal, oblique or pendant fruiting branches. The olive bears fruit on 2-year-old wood and the flowers develop only on the wood that has grown out during the preceding spring. Pruning should therefore induce the development of replacement wood to ensure a yearly supply of fruiting branches. To achieve this the advice is: Remove or shorten the branches that have already borne fruit so that replacement shoots will grow out from below. Suppress the vertical water-sprouts except those required to replace branches that have been removed, or to occupy a space. Limit the height of the tree by cutting back branches that have a tendency to run to wood. Cut out all dead wood, branches that cross, and shoots growing towards the centre of the tree. Retain a reasonable number of fruiting branches, particularly those that are pendant.

1306. SONESSON, N. 631.875
Danokompostens användning. **(The application of Dano compost.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. Jämte Årsbok, 1942, Stockholm, 1943, pp. 155-63.
Dano compost, prepared from town refuse, is widely used in Denmark, especially as a source of heat in hotbeds and for soil improvement. Reference is made to Swedish trials with the material by R. Lamm [for which see *H.A.*, 15: 138].

1307. ROGERS, W. S., AND RAPTOPOULOS, T. 634.1/2-1.874
Cover crops for fruit plantations. II. Annual cover crops. III. Time of sowing and winter washing in relation to spray damage to annual cover crops.
J. Pomol., 1946, **22**: 92-102, 103-10, bibl. 16.
These two articles are a continuation of a previous one already noted (*H.A.*, 15: 487). Part II gives a review of English orchard conditions in relation to the use of cover crops, the characteristics and yields of various annual crops at East Malling, and detailed experimental results of three years' growth of six annual cover crops under 30-year-old Barnack Beauty apple trees. Cover crops tested for three years were (1) oats plus tares (winter), (2) the same (spring), (3) rye plus peas, (4) rape, (5) broad red clover and (6) mustard, compared with clean cultivation. Highest yields of green matter were given by (1), followed by (5) and (2). All increased the percentages of organic matter in the upper 12 inches of soil, those of (1), (5) and (4) being the largest. All cover crops caused an average increase of 12% in the fruit crop. Under East Malling conditions the most reliable cover crop tested was winter oats plus winter tares. Broad red clover in spring has also given good results. Certain weeds can provide useful yields as autumn cover crops. Part III records the results of different times of sowing crimson clover and winter oats plus tares, and of applying orchard winter washes, in relation to spray damage, growth and yield of the cover crop, in two seasons. The best months for sowing crimson clover were July and August; and for winter oats plus tares, September. Winter washes caused least harm to the cover crops when applied as late as possible—tar oil in February, dinitrocresol in February or March. Dinitrocresol was less harmful than tar oil applied early, and about equal to tar oil applied late. Dinitrocresol damaged tares and crimson clover more than oats, but tar oil more severely affected oats than tares. Petroleum oil did but little harm to the plants. In preliminary tests rye proved to be more resistant than oats to tar oil damage, and 6% thiocyanate was less harmful to many cover crops than tar oil or dinitrocresol. Vigour of the plant at the time of spraying, and intensity and duration of cold conditions following the spraying, are the main factors apart from specific characters of individual cover crops and winter washes, controlling the reaction of cover crops to the harmful effects of winter sprays.

1308. BREGGER, J. T. 634.1/7-1.67
Principles of moisture conservation and irrigation in the orchard.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 36-44.
Observations show that in 24 out of the last 26 years drought resulted in reduction of or injury to fruit crops in Western Virginia. Close spacing of fruit trees seriously aggravates risk of damage from drought. Transpiration is the chief factor in soil moisture loss. Cover crop competition varies with the species involved and with depth of rooting. Some of the shallower-rooted grasses such as blue grass [Timothy] become dormant during dry weather and not only offer very little competition but also act as a mulch. Lucerne, sweet clover and both perennial and annual lespedezas with their deep roots and active summer growth cannot be recommended as cover crops for orchards, except for those on deep soils and in areas of ample rainfall. The presence of available soil moisture is specially essential during the two distinct growth periods of the peach, i.e. after petal fall and before harvest. The most desirable cover crop is one that will make its greatest growth at periods when fruit demands are least and during maximum rainfall. Terracing and mulching are other methods of conserving soil moisture; terracing is considered here. Short observations are made on conditions affecting irrigation in the orchard and on how methods should be adapted to suit them.

1309. GILBERT, E. J. (Chairman). 634.1/7-1.67
Orchard irrigation.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 75-9.
This is an account of a panel discussion on various aspects of orchard irrigation. After a general account of the soil factors affecting orchard irrigation the discussion devolved on orchard sprinkling, and horticulturists submitted accounts of their experiences. It was generally agreed that irrigation by sprinkling is more advantageous than by rills or ditches and that the cost is less.

1310. WILLIAMS, V. C. 631.67
New developments in reclamation research.
FITZPATRICK, J. T.
Autumn irrigation for 1946.
LYON, A. V.
Requirements for tile drainage.
Fmrs' Newsletter Soils Irrig. Extens. Serv. C.S.I.R. Aust. **9**, 1946, pp. 8.
Wide fruit growing areas in Australia, where irrigation was once practised, are now lost to the industry owing to a high water table associated with salting. The problem has been studied at the Griffith Research Station and tile drainage recommended for certain types of soil, both for reclamation purposes and for prevention.

1311. VYVYAN, M. C. 634.11/13: 577.15.04
Experiments with growth substance sprays for reduction of pre-harvest drop of fruit.*
J. Pomol., 1946, **22**: 11-37, bibl. 20.
Sprays containing α-naphthaleneacetic acid, at concentrations ranging from 2½ to 10 p.p.m., have been tried on

* See also Fruit fall and its control by synthetic growth substance by M. C. Vyvyan, *Tech. Commun. Bur. Hort.* 1946, 3s. 6d.

varieties of apple and one of pear, in experiments spread er 5 seasons at East Malling. Preliminary accounts of e experiments have already appeared (see *H.A.*, 11: 1126; : 1267; 13: 1194; 14: 1540). A large gain in crop was otained with Beauty of Bath, Miller's Seedling and Worces- r Pearmain apples, and Conference pear also responded ell when picked late. Use of the sprays on those varieties recommended. Less effect was obtained on Cox's Orange ppin and Bramley's Seedling, and further tests are neces- ry before routine spraying of these varieties can be commended. A concentration of 10 p.p.m. is recom- ended, though 5 p.p.m. may be sufficient for summer rieties in hot weather. It is important to time the plication of the spray so that its effective period covers e time when drop is likely to be most severe. Ten days one month before the picking date seems usually to be out right. Equations are suggested for calculating the opping tendency and the most convenient index of spray fect. A table for converting "drops" at simple, into rates" at compound interest appears as an appendix.

12. BATJER, L. P., AND THOMPSON, A. H. 577.15.04: 634.1/7
Recent developments in the field of hormone sprays.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 180-4.

preliminary test with 2-4-dichlorphenoxyacetic acid -4-D) showed it to have considerable promise for extending e effective period of fruit drop sprays with certain apples. ius though almost completely ineffective on Duchess, cIntosh, and Delicious, it was outstandingly successful th Winesap. Extensive observations and commercial ld tests during the year with an aeroplane as a method of plying hormone spray [naphthaleneacetic acid] showed at this method compared favourably with more normal ethods. In all cases with Winesap, ground spraying was mewhat more effective than the aeroplane, though the tter method of application resulted in satisfactory control fruit drop. Observations have indicated that in some stances advanced fruit maturity is associated with the use hormone sprays. With some fruits, particularly Bartlett ars, the hormone-maturity relationship is further com- cated by great variations in time of harvest, delayed orage, duration of storage period and storage temperature. experiments on certain summer apples it was found) that by picking the mature fruit every 2 days the harvest as concluded on the hormone sprayed trees well in advance the check trees, (2) on other trees several pickings of uits at different stages of maturity were made over a riod of 6 days followed by a clean-up harvest, at which ne the unsprayed trees were carrying a much larger rcentage of "green fruit". It was concluded that the rmone directly advanced the maturity of the summer ples. The chief trouble from the use of hormone sprays Bartlett pears comes only from the fruit of late or an-up pickings; at this stage the pears are well beyond timum maturity for both shipping and canning. All experimental work emphasizes the importance of concluding harvest before overmaturity develops.

Standardization.

1313. VAN DER K. MEIJBURG AND/OR HANCK, A. 351.823.1: 634+635
Standardization of fruits and vegetables.
Mon. Bull. agric. Sci. Pract. Rome, 1944, **35**: 132T-3T, 1945, **36**: 87T-102T, 137T-67T.

Further articles are given showing the regulations enforcing standardization of fruit and vegetables in different countries [see also *H.A.*, 13: 1206]. In the first of these later articles regulations in Finland are considered, in the second those in England and Wales, and in the third regulations in the following countries:—British Honduras, Windward Islands, Leeward Islands, Netherlands East Indies, Éire, Jamaica, Japan, Malaya, Malta, Norway, New Zealand, Palestine, Holland, Switzerland, Trinidad, Turkey.

Noted.

1314. BARBUT, M. 63(65)

a La recherche et l'expérimentation agricole en Algérie. Considérations générales. **(Research and agricultural investigations in Algeria.)**
Ann. Inst. agric. Algér., 1939, **1**: 1: 3-14.

b DAHL, C. G. 634/635(48.5)
Trädgårdsundervisningen i Sverige. **(Horticultural instruction in Sweden.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942, Stockholm, 1943, pp. 109-21.

c ELLENWOOD, C. W., HAVIS, L., AND HOWLETT, F. S. 634.1/8(77.1)
Fruit varieties for Ohio.
Bull. Ohio agric. Exp. Stat. **627**, 1942, pp. 50, bibl. 15.
Includes both top and small fruits.

d ELLISON, J. W. 634.11: 658.7/8
Marketing problems of Northwestern apples, 1929-1940.
Reprinted from *Agric. History*, 1942, **16**: 103-15, bibl. 39.

e MEURMAN, O. 634.11
Melba, Kanadalainen omenapuulajike. **(The Canadian apple variety Melba in Finland.)**
Valt. Maatalousk. Tiedon., 1940, No. **177**, pp. 13, bibl. 10.

f PARRISH, B. D. 634.25-1.16
Peach production costs in the Yakima Valley, Washington, 1943 and 1944.
Bull. Wash. agric. Exp. Stat. **467**, 1945, pp. 12.

g THORSELL, J. E. 634.1/2-1.546.4
Blomsterodlarens fruktodling. **(Fruitgrowing for the flower grower.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942, Stockholm, 1943, pp. 99-108.
Chiefly training of wall trees.

SMALL FRUITS, VINES AND NUTS.

15. COLBY, A. S. 634.1/8-1.523
How United States and Canadian Experiment Stations evaluate, name and distribute their small fruit.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 185-214.

e commend this article very strongly to all interested in e managerial as opposed to the technical side of breeding. ie following important points are discussed with notes on licy adopted in different States. (1) *Where and how edling progenies are tested*, i.e. (*a*) at the station, (*b*) at the tion and at other stations and by grower co-operators, at the station, sub-station and grower co-operators. (2) *The standards of selection* in each State, whether for appearance, yield, taste, disease resistance, etc. (3) *Basis on which names are given.* (4) *Methods of disseminating* proved new material.

1316. PAVLOVA, N. M. 634.7-1.521-2.111
Original material for the breeding and cultivation of bush fruits. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 33-46.

The article gives guidance to breeders in their search for species and varieties of currants, gooseberries, and rasp- berries which can be used for crossing, in order to produce

varieties suitable for cultivation in northern latitudes and other regions where bush fruits are required but difficult to grow. A number of little-known species and varieties—some cultivated locally, others wild—from European Russia, Siberia and Central Asia are recommended for breeding.

1317. RIETSEMA, I. 634.711-1.523
Radboud en Gertrudisframbozen. **(Radboud and Gertrudis raspberries.)**
Meded. Direct. Tuinb., 1946, pp. 387-90.

In order to solve the raspberry mosaic problem raspberries have been inbred for several generations so as to obtain large-fruit strains true to seed. The plants obtained were weaklings. By intercrossing these inbred strains vigorous healthy hybrids with large fruit were obtained, the mosaic virus not being transmitted to the seedlings and hybrid vigour compensating for the decreased vitality. The new material raised, which is not seed-constant, is on the market under the registered names Radboud and Gertrudis.

1318. DE CARVALHO E VASCONCELLOS, J. 634.851
Sistemática na " Vitis vinifera " L. **(Classification in the grape vine.)**
An. Inst. Sup. Agron. Lisboa, 1942, **13**: 69-81, bibl. 47.

A critical review of the various classifications of the varieties of the grape vine.

1319. MARIMAN, G. 634.8(493)
Histoire de la viticulture belge en plein air et sa rénovation possible. **(The history of open-air viticulture in Belgium and its possible revival.)**
Progr. agric. vitic., 1946, **125**: 346-51.

This article gives an account of open-air vine growing in former times in Belgium, and makes a plea for its revival. It is advised that two or three rows of vines should be grown in gardens, that horticultural schools should have open-air plots of vines, that the courses in horticulture should include instruction on open-air vine growing on espaliers and on poles, and that the former vine terraces should be replanted. Such renovation would involve (1) identification, propagation and distribution of varieties known to be suitable for Belgium, (2) a study of results obtained in other countries so that trials could be carried out with foreign varieties to test their resistance to oidium and to failing to set, and determine those that leaf-out late and readily recover after spring frosts. A list of varieties recommended for growing in Belgium is given.

1320. LAGARD, P. 634.843
Les berlandieri-rupestris. **(The berlandieri-rupestris hybrids.)**
Progr. agric. vitic., 1946, **125**: 186-90, 232-7, bibl. 6.

Vitis berlandieri, one of the American vine species, has proved particularly suitable for calcareous soils and it is also resistant to phylloxera. Its one great fault is that it is almost impossible to raise from cuttings. It has been crossed with other varieties to get over this difficulty and the article chiefly consists of descriptions of a number of rupestris-berlandieri hybrids.

1321. DA COSTA E SOUSA, L. DE O. M. 634.8: 581.162.3
Casos de sui-produtividade nalgumas castas de uvas de mesa. **(Self-fertilization in certain varieties of table grapes.)**
An. Inst. sup. Agron. Lisboa, 1942, **13**: 83-98,

Three types of experiments are described: (*a*) Isolating inflorescences within paper bags after removing a few flowers already open. (*b*) Removal of the anthers shortly before the opening of the corolla and then covering the inflorescences with paper or muslin bags. (*c*) Removal of the anthers shortly before the opening of the corolla and then covering the inflorescences with paper bags. In all cases except in two Alicante varieties (in which the inflorescences withered) the inflorescences gave rise to bunches comparab with those produced by the controls. The develo ment of the berries in the bunches produced with paper bags was similar to that of the berries in the bunch produced within muslin bags. The removal of anthe when a few flowers are beginning to open can cause the dehiscence and so induce fertilization. The protection the inflorescences with paper bags in some of the mo sensitive self-fertile varieties may improve the yield. was established that Alicante encarnado and Alicante Malago are botanically identical, and also Sultana a Sultanine à gros grains.

1322. GEERING, J. 634.8-1.84
Über die Stickstoffdüngung der Reben. **(Nitrogen manuring of vines.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 200-2.

For years in which no stable manure is given nitrog applications to vines are recommended at the followi rates per hectare: (1) 200-300 kg. ammonium sulpha (20·5%) or 300-400 kg. ammonium nitrate (15·5%) spring, shortly before bud burst; (2) 200-300 kg. calciu nitrate (15·5%) at blossoming. An application of liqu manure in place of the spring application followed later calcium nitrate is beneficial.

1323. MAUME, L., AND DULAC, J. 634.8-1.8-1.4
Une jeune vigne peut tirer parti de certains éléments du sol la même où une vigne agée souffre de carence prononcée. **(Young vines can take up certain elements from a soil on which old vines have previously shown pronounced symptoms of deficiency.)**
C.R. Acad. Agric. Fr., 1945, **31**: 286-9.

The authors record observations on a young vineyard whi shows no signs of potash deficiency, although occupyi the site of an old vineyard that had shown the pronounc leaf scorch symptoms indicative of lack of potash. would appear that young plants are better able to utili soil nutrients than those which, by reason of age, ha defective absorption and transpiration systems.

1324. GRAVES, A. H. 634.53-1.523
The Brooklyn Botanic Garden Chestnut Breeding Project.
Contr. Brooklyn bot. Gard. **102**, 1945, pp. 21-31, being reprint from *35th A.R. north. Nut Growers' Ass. for 1944*, 1945.

Although the breeding project is primarily interested producing for timber chestnut hybrids resistant to bli (*Endothia parasitica*), the development of a good edible is not entirely neglected, and a report on this phase of problem is promised.

1325. HAYAUX DU TILLY, J. 634.53 + 634.51
Décadence de la culture du châtaignier et du noyer. **(The decline in chestnut and walnut cultivation.)**
C.R. Acad. Agric. Fr., 1945, **31**: 183-7.

During the last 50 years the production of dessert grap apricots, cherries, pears and dessert apples in France doubled, that of plums has remained stationary, while t of walnuts and chestnuts has fallen by two-thirds a three-quarters respectively. The author makes a br survey of the regions producing the nuts and the causes the lowered production. The diminution in the yield chestnuts has been largely due to the ink disease (*Phy phthora cambivora*), to attacks by insects (*Carpocapsa* a nut weevil), and to the use of the trees as a source of tann The conclusion drawn is that the chestnut and waln because of their wood and their fruit, should be cultivat more, and that the authorities should encourage this supplying information on the cultivation and grafting the trees, and the harvesting, preservation, sale and expor tion of the fruit.

6. Bösch, J. 634.8(494)
Berneck und sein Weinbau. **(Vine growing in Berneck, Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 110-4.
Particularly its organization.

Mathieu-Reverdy, G., and Triby, E. 663.25
L'appellation d'origine "Villaudric" (Haute-Garonne). **(The meaning of the term Villaudric applied to wine.)**
Le type de vin de Villaudric (Haute-Garonne). **(Determination of the wine type Villaudric.)**
Reprinted from *Bull. Agric. S.-Ouest* **227**, Nov. 1944, pp. 12, bibl. 6.

c Mathieu-Reverdy, G. 634.8(44)
Le vignoble et les vins des "Côtes de Fronton". **(The Côtes de Fronton vineyards and wines [Toulouse district].)**
Reprinted from *Bull. Agric. S.-Ouest* **239**, XI, 1945, pp. 14, bibl. 4.

PLANT PROTECTION OF DECIDUOUS FRUITS

7. Lindfors, T. 632.3/9: 634/635(48.5)
Växtskyddet inom svensk trädgårdsodling. **(Plant protection in Swedish horticulture.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942, Stockholm, 1943, pp. 122-32.
e development of the Swedish Plant Protection Station l of its activities is described by its Director. The chief ctions of the institute are (1) the biological study of plant ases and pests; (2) the experimental evolution of control asures and the testing of existing methods; (3) the spread nformation on plant protection by publications, exhibi-ns, demonstrations, etc.; (4) help to growers by answering stions, identifying diseases and pests, either in the oratories or on the spot, and by advice as to control asures; (5) the issue of early warning of imminent attacks suggestions as to counter measures; (6) the prevention the introduction of new pests and diseases and of the ead of dangerous parasites within the country.

8. Ciferri, R. 632.95(45)
Il centro di studi sugli anticrittogamici presso il R. Laboratorio crittogamico e il R. Osservatorio fitopatologico annessi all' Università di Pavia. **(The work of the Plant Disease Control Centre at Pavia.)**
R. Laboratorio Crittogamico, Pavia, 1945, pp. 8.
e Laboratory was set up in 1870, the Disease Control ıtre in 1942, its main object being to examine new disease trol substances and report on them from all essential ıts of view. The methods used are described in general ns.

9. Kuenen, D. J. 632.95: 634.1/7
Ervaringen van een reis naar Engeland in verband met de ziektenbestrijding in de fruitteelt. **(Information obtained from a visit to England in connexion with the control of diseases in fruit culture.)**
Fruitteelt, 1946, Jg. 36, pp. 87-8.
s is an account of information obtained by the author two other scientists accompanying him during a visit weeks to England when they visited various labora-es, experiment stations, institutes and manufacturing blishments. It comprises notes on the control of leaf aphids, (2) apple sucker (*Psylla mali*), (3) woolly d (*Eriosoma lanigerum*), (4) cherry fruit moth (*Argyres-ephippiella*), (5) codling moth (*Carpocapsa* [*Cydia*] *onella*) and (6) apple sawfly (*Hoplocampa testudinia*).

0. Marsh, R. W. 632.3/4: 633/635
Mycological contacts.
Trans. Brit. myc. Soc., 1945, **28**: 1-10.
his article, his presidential address to the British Myco-cal Society, the author discusses the relation that ology bears to agricultural and horticultural science, particular reference to recent work on nutritional and gal diseases of crop plants, and on the co-operation of nists and mycologists in the control of plant diseases.

1331. Darpoux, H. 632.95
Les bases scientifiques des avertissements agricoles. **(The scientific bases of agricultural warnings.)**
Ann. Épiphyt., 1943, **9**: 177-205, bibl. 40.
The determination of the best periods for applying control measures against plant pests and diseases is most important in agricultural practice. The present paper discusses the factors involved in prognosticating outbreaks of vine mildew, potato blight, apple and pear scab, codling moth, and eudemis (*Polychrosis botrana* Schiff) and cochylis (*Clysia ambiguella* H.B.) of the vine, so that steps may be taken in time to prevent serious attacks.

1332. Berg, A., and Clulo, G. 634.11-2.19: 546.711
Manganese toxicity, a factor in the cause of internal bark necrosis (Apple measles).
Abstract in *Phytopathology*, 1946, **36**: 395.
Investigations showed that the tissues of apple trees affected with bark necrosis usually contained abnormal amounts of manganese. Preliminary experiments indicate that incorporation of lime in the soil inhibits absorption of manganese and tends to prevent the condition.

1333. Demolon, A., and Bastisse, E. 632.19: 634.1/7
Observations sur la géochimie du fer, application au traitement de la chlorose. **(The geochemistry of iron and its application in the control of chlorosis.)**
C.R. Acad. Agric. Fr., 1944, **30**: 501-3.
Iron salts react with alkaline silicates to form pseudo-solutions of ferri-silicic complexes, which are stable through a pH range of 3·5 to 12·0 and are not precipitated in the presence of calcium carbonate. Experiments have shown the efficacy of such ferri-silicic complexes in controlling chlorosis of vines and fruit trees growing in calcareous soils. They have been used for soil treatment, for sub-cortical injection and for injecting the wood. For injecting the wood of fruit trees the technique is as follows: At 10 or 20 cm. above the soil a hole is made in the trunk on the side facing north, its diameter being about one-tenth of that of the stem, and bored to a depth of three-quarters of the stem, and even deeper but without going completely through the stem. The hole is inclined downwards and is filled with a ferri-silicic complex in the form of a powder; it is then stopped up with grafting wax. The operation can be done probably at any season, but experience has shown that the best time is just before or just after the tree begins to grow again in spring, from the beginning of February to the end of March or mid-April.

1334. Harper, H. J. 631.811.8: 634.521: 631.453
Effect of chloride on physical appearance and chemical composition of leaves on pecans and other native Oklahoma trees.
Tech. Bull. Okla agric. Exp. Stat. **T-22**, 1946, pp. 30, bibl. 15.
Alleged salt water damage to trees, notably pecans, has been the cause of many controversies in Oklahoma. Five years' investigations showed that a less laborious method of

determining chloride injury than soil sampling gives reliable results. A chloride content of over 0·6% in pecan leaves, collected in late August or early September, was found to indicate severe damage. Also visible leaf symptoms, such as a brown margin or scorching, may be trusted. Pecan trees were found to be abnormally susceptible to chloride, even a chloride content of 200 p.p.m. in the dry soil being injurious.

1335. JARDINE, F. A. L. 634.8-2.19
The use of borax on Waltham Cross grapes in the Stanthorpe district.
Qd agric. J., 1946, **62**: 74-8.

Successful trials with borax for the control of "hen and chicken" disorder in grapes are recorded. A badly affected bunch with this disorder carries a small number of normal-sized berries ("hens"), whilst the greater part of the bunch consists of undersized worthless fruits ("chickens") resembling currants, most of them half the normal size. From the results obtained the author's recommendations are:—In view of the possibility of rain falling shortly after spraying, thereby necessitating a second treatment, soil dressings of borax are preferred to sprays for the control of the disorder in Waltham Cross grapes. In the Stanthorpe district, powdered borax, as a soil dressing at the rate of 1 oz. to 2 oz. per vine, according to the age of the vine, is recommended and it should be applied, preferably, during the month of August. Where a foliage spray is preferred a solution of 1 lb. of powdered borax in 20 gal. of water is recommended, and it should be applied approximately 3 weeks before blossoming. It is particularly stressed that borax used in excess is toxic to vines, and growers are warned against using quantities greater than those recommended.

1336. KUHN, W. 632.111: 551.5
Die meteorologische Seite des Frostproblems. **(The meteorological aspect of the spring frost problem.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 159-61.

The difficulties are discussed of giving reasonably accurate spring frost warnings in Switzerland, where climatic conditions vary so much from one place to another within a small area. To a large extent, meteorologists will depend on local observations made by the public. At Zürich, a temperature loss of 8° C. was found to be the extreme value in a clear night if the reading was made at 4 p.m. on a damp thermometer. Hence, if the temperature at 4 p.m. is +8° C. or more, no frost will occur that night.

1337. MEYER, A. 634.23-2.111
Zu den Frostschäden vom 1. Mai 1945 in der Nordwestschweiz. **(A survey of the frost damage of May 1st, 1945 in north-western Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 108-10.

The author toured a wide area in north-western Switzerland on 1 May, 1945, to study the extent of the frost damage suffered by the cherry blossom during the preceding night. His findings are summarized in a map showing affected districts in black. There was little wind during the night and the cold air collected in pockets in the valleys with a depth of 30 to 100 m. or more, in which the hill tops formed islands. The Rhine, with a water temperature of 9° C., protected a strip of land along its banks.

1338. FÄH, E. 634.8-2.111
Möglichkeit einer Frostversicherung für den Weinbau. **(The possibility of frost insurance in Swiss viticulture.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 132-5.

Insurance against frost in Swiss viticulture would be possible only on the basis of a harvest insurance, which would exclude the popular insurance against hail damage.

1339. MODLIBOWSKA, I. 634.11-2.111
Frost injury to apples.
J. Pomol., 1946, **22**: 46-50, bibl. 7.

Three types of frost injury were recorded on apple fruitlets after the frost in May, 1944: (1) loosening of the s (2) radial splitting of the cortex, and (3) discoloration ovules and placenta. Loosening of the skin began to generally after about 3 days but radial splitting was usu fatal. Recovery from internal discoloration depended its degree and extent and on the nutritional condition of injured fruitlets; thus discoloured king fruitlets in unthin clusters failed to develop, but those of clusters from wh the other fruitlets were removed continued to deve Secondary flowers were less injured by frost than fruitlets from normal flowers, but even so they ra developed. In general the ultimate crop of apples Merton (Surrey) was not greatly affected.

1340. REBOUILLON, A. 634.36-2.111
Effets des froids tardifs sur la végétation des mûriers en 1938-1939. **(The effects of late frosts on mulberry trees in 1938-1939.)**
Ann. Épiphyt., 1941, **7**: 7-19.

Observations on 38 varieties of mulberry with referenc their varietal susceptibility to late frosts, and on trees of particular variety with regard to their situation and stag development at the time of the frost.

1341. TUMANOV, I. I. 634.1/2-2.111
Autumn development and winter hardiness in fruit trees. [Russian and English summary.]
Isvest. Acad. Sci. U.S.S.R., Biol. Ser., 1945, No. 5, pp. 546-66, bibl. 23.

The author considers that recent losses in severe win were due to a great extent to the unfavourable environme conditions affecting the trees during summer and autu Winter hardiness will develop in trees if they have time completing their growth and fruiting. Short, wet, cold dry summers, if combined with faulty orchard manage may prevent the development of hardiness and will re either in damage by, or loss through, frost in the follow autumn and winter. Experimental defoliation of peac apricots and apples at various periods of growth development indicated that a direct causal conne exists between the accumulation of sufficient stores reserve nutrients and frost resistance in trees. Ring experiments on trunks or branches indicated that operation interfered with the movement, along the bar either direction, of some activating substances stimula and enhancing autumn- and winter-hardiness. All tru and branches were destroyed even by moderate frosts ab or between the rings. A suggestion is made that formation of such substances is related in some, as unknown, fashion to cambial growth. The view is expre that winter-hardiness of fruit trees is due to the disapp ance towards autumn of the activating substances whic the previous period maintained vegetative developmen fruit trees. A proportion of the activating substa becomes inactivated; and the remainder descends into root system thus preventing it from acquiring a state winter hardiness.

1342. PAVLOVA, L. I. 634.11-2.111
The influence of cultivation and management on the winter hardiness of apple orchards. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 184-5.

In two comparable 10-year-old orchards near Lenin loss from the severe winter of 1939-40 was slight in which had been accustomed to proper cultural treatr but very heavy in the other which had been neglected.

1343. LITVJAKOV, P. P. 634.23-2.111
The survival of cherries during the winter of 1938-39 at Mičurinsk, and the influence of cultivation and management on winter hardiness. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 29-32.

The worst damage by freezing was found to be am

neglected trees growing in exposed situations where the soil was too dry, there was no protective covering of snow, and the root system was shallow and ill-developed. Cherries on sour cherry stocks suffered the most harm, those on Antipovka suffered less, and on the steppe cherry (*Prunus chamaecerasus*) least of all. But the most important factor conferring resistance on the trees were soil conditions which ensured a large water-holding capacity and a vigorous ramifying root system. If roots have been damaged by the cold, the foliage must be pruned until its extent is in keeping with that of the surviving portions of the root system. Before autumn, channels must be dug round the trees and filled with water. When this has soaked in, and the channels are filled with dry soil, the trees are well fortified against the winter cold. A rainless summer and autumn and a heavy crop of fruit, which leave the roots in a dry soil, are the usual precursors of damage by freezing.

1344. MARSOLAT, R. 634.8-2.13
Traitement des vignes grêlées. (**Treatment for vineyards damaged by hail.**)
Progr. agric. vitic., 1946, **125**: 399-405.
Methods suggested for preventing hailstorms are discussed and dismissed as ineffective. The viticulturist can rely only on curative measures. The best methods of pruning the damaged vines, so as to restore to some extent their productivity, are described and illustrated.

1345. ARNAUD, G. 634.8-2.142
La vigne et l'électricité atmosphérique. (**Lightning damage to vines.**)
Ann. Épiphyt., 1941, **7**: 55-62, bibl. 6.
Observations are recorded on lightning damage to vines around Bordeaux in July, 1940. The injury was chiefly on the young leading shoots and showed as a superficial browning of the internodes, the tissues of the nodes being mostly normal. Internally the browning was seen especially in the pith. The lateral shoots usually showed little or no injury at first, but sometimes wilted later because of injury lower down.

1346. KUHNHOLTZ-LORDAT, —. 632.4
Notes de pathologie végétale. (**Notes on plant diseases.**)
Ann. Épiphyt., 1942, **8**: 61-80; 1943, **9**: 207-13; 1944, **10**: 55-63.
These notes include descriptions of scab (*Fusicladium eriobotryae* Cavara) on loquat (*Eriobotrya japonica*), phacidiosis (*Phacidium repandum*) and phomosis (*Phoma atomus* (Lev.) Auersw.) on madder (*Rubia tinctorum*), "red disease" of the mulberry caused by *Nectria cinnabarina* and *Fusarium urticearum* (Corda) Saccardo, bacteriosis of mulberry (*Bacterium mori* G. Boyer), *Armillaria mellea* and *Rosellinia necatrix* on fig, *Phyllosticta mespili* on medlar, *Peronospora parasitica* on stocks (*Matthiola incana*) and cladosporiosis (*Cladosporium herbarum*) of the capitula of sunflower (*Helianthemum annuus*).

1347. BARTHELET, J., AND VINOT, M. 632.4(447/449)
Notes sur les maladies des cultures méridionales. (**Notes on diseases in southern France.**)
Ann. Épiphyt., 1944, **10**: 11-23, bibl. 12.
The following are described: 1. Diseases of the fig: root rot (*Armillaria mellea*), die back (*Fusarium lateritium*), canker (*Phomopsis cinerescens*), cercosporiose (*Cercospora bolleana*), and rust (*Kuehneola fici*). 2. Scab of sweet fennel (*Fusicladium depressum*). 3. Alternariose of carrot (*Alternaria brassicae* f. *exitiosa*). 4. Cypress coryneum (*Coryneum cardinale*). 5. Palm rot (*Thielaviopsis paradoxa*).

1348. MOORE, W. C. 632.4
New and interesting plant diseases.
Trans. Brit. myc. Soc., 1945, **28**: 127-33.
Diseases of horticultural interest described in these notes are: scale spotting of tulip bulbs; ring rot of green walnut fruits (the associated fungus is a *Fusarium* sp.); leaf spot of spinach (*Heterosporium variabile* Cooke); *Phytophthora infestans* (Mont.) de Bary on *Lycium halimifolium* Miller; a seedling disease of celery caused by *Alternaria radicina* Meier, Drechsl. & Eddy.

1349. STAKMAN, E. C., AND CHRISTENSEN, C. M. 632.4
Aerobiology in relation to plant disease.
Bot. Rev., 1946, **12**: 205-53, bibl. 151.
The most important and heaviest load of plant pathogenic inoculum carried by the wind is that of fungus spores, but the wind may be of importance occasionally in the dissemination of certain bacterial plant pathogens and viruliferous insects, or even of certain viruses themselves. The cereal rusts are given prominence in this review as good examples of long distance dispersal. Certain pathogens of orchard crops come under notice for local dissemination, e.g. apple scab (*Venturia inaequalis*), apple rust (*Gymnosporangium juniperi-virginianae*), and currant rust (*Cronartium ribicola*).

1350. BARTHELET, J. 632.4: 634.1
Recherches sur quelques parasites des arbres fruitiers. (**Research on certain parasites of fruit trees.**)
Ann. Épiphyt., 1943, **9**: 27-45, bibl. 27.
Descriptions and illustrations are given of (1) *Coryneum folliicolum* Fuckel causing an apple rot, (2) *Phacidiella discolor* (Mout.) Poteb. producing fruit rot and branch cankers of pear, (3) *Diaporthe* sp. associated with a rot of apples that takes the form of reddish-brown spots 6-8 mm. in diameter with a darker central spot 2-3 mm. in diameter, (4) *Phomopsis mali* Rob. causing a rot of pears.

1351. BAWDEN, F. C. 632.8
Virus diseases of plants.
J. roy. Soc. Arts, 1946, **94**: 136-68.
In this article, compiled from three lectures given by the author to the Royal Society of Arts in November and December, 1945, is reviewed work that has been carried out on various aspects of plant virus diseases. After an introduction on the nature of viruses he discusses them under: external symptoms; virus strains and mutation; internal symptoms; methods of transmission; transmission by insects; factors affecting spread in the field; transmission by seed; the purification of viruses; chemical properties; physical properties; the size of virus particles; the multiplication of viruses. The article does not include a list of viruses and their host plants [such lists are to be found in other publications, see e.g. *H.A.*, 16: 546], but is a readable account of the properties of plant viruses and what they can do and are doing in reducing the yield of crop plants. It has 24 striking photographic illustrations. To the reviewer the two most interesting of these are fig. 3—breaking in wallflowers caused by infection with cabbage ringspot virus, indicating how one host plant can be a source of infection for another, and fig. 21, an electron micrograph of tobacco virus ×48,000, as an illustration of how modern physics assists in elucidating a plant pathological problem.

1352. FRAMPTON, V. L., AND TAKAHASHI, W. N. 632.8
Electrophoretic studies with the plant viruses.
Phytopathology, 1946, **36**: 129-41, bibl. 11.
The moving boundary method of electrophoresis is outlined. Specific scanning patterns were obtained for a number of virus diseases of cultivated plants, including cucumber mosaic.

1353. ROSELLA, E. 634.11-2.8
Sur un cas de dépérissement des pommiers. (**A case of die-back in apples.**)
C.R. Acad. Agric. Fr., 1945, **31**: 257-8.
The disease noted in Limagne and here described is different from the ordinary types of die-back in apple trees. On affected trees the foliage is crowded and the internodes shorter than normal, the leaves are smaller and less green, the fruits fewer and smaller and the reddish tint of the trunk and branches is more accentuated. It is suggested that the die-back is caused by a virus disease.

1354. MILLS, W. D. 634.23-2.8
Temperature effects on the expression of the yellows virus in sour cherries.
Phytopathology, 1946, **36**: 353-8, bibl. 9.
The chief factor determining the expression of virus yellows in the orchard in any given season is the prevailing temperature during the 30-day period following the petal-fall stage. The effects of early bloom in increasing the expression of yellows symptoms is due to the lower temperatures normally following such an early bloom. The prevailing temperatures after yellows symptoms first appear do not affect the degree of these symptoms. The amount of precipitation in any season does not appear to affect the severity of yellows symptoms. The incidence of cherry leaf spot also does not appear to influence the appearance of yellows symptoms. Since prevailing temperatures following the petal-fall stage cause a great variation in the apparent amount of virus yellows present in an orchard from year to year, it appears that no data observed to date, based on the apparent incidence of yellows in two different years, prove or disprove spread of the cherry-yellows virus after the trees are set in the orchard. [Author's conclusions.]

1355. WILLISON, R. S. 634.25-2.8
Peach blotch.
Phytopathology, 1946, **36**: 273-6.
A graft-transmissible disease of peach is described. The symptoms are well-defined pale green to yellowish green areas very variable in size and shape, ranging from numerous angular spots scattered over the leaf surface to larger, irregular blotches usually fewer in number.

1356. COCHRAN, L. C., AND RUE, J. L. 634.25-2.8
Interaction of some forms of the peach mosaic virus.
Abstract in *Phytopathology*, 1946, **36**: 396.
It appears that the peach-mosaic virus is a complex of variously related forms which compete in peach; they produce a symptom gradient on Hale peach, ranging from a severe effect to one so mild that diagnosis is doubtful.

1357. PRENTICE, I. W., KING, M. E., AND HARRIS, R. V. 634.75-2.8
Experiments on virus degeneration of Huxley strawberry.
J. Pomol., 1946, **22**: 111-6.
The symptoms of a virus degeneration disease of the Huxley strawberry variety in England are a reduction in size and vigour of affected plants and a less glossy, grey-green appearance of the leaves. Marginal chlorosis of the younger leaves occurs, particularly in the autumn. The disease is graft-transmissible and has also been induced by grafting Royal Sovereign plants infected with yellow-edge and crinkle to vigorous Huxley plants also infected with those diseases. It is not induced by grafting virus-free Royal Sovereign plants to vigorous Huxley. The roguing of Huxley runner-beds for degeneration symptoms is advised.

1358. BRANAS, J. 634.8
Sur quelques problèmes viticoles d'actualité. **(Present day problems in viticulture.)**
C.R. Acad. Agric. Fr., 1945, **31**: 40-3.
This article deals with the present situation in French viticulture regarding organization for maintaining the purity of stocks and the control of court-noué. It is stated that recent observations suggest that court-noué is a virus disease transmitted by the phylloxera on the roots, but that experimental confirmation is required.

1359. CUNIN, G. 634.8-2.8
Dépérissements de la vigne dans la région de Philippeville. **(Losses among vines in the Philippeville district of Algeria.)**
Ann. Inst. agric. Algér., 1942, **1**: 2: 100-25, bibl. 7.
A detailed description of the symptoms of court-noué as they have been observed in Algeria with notes which should help the vine grower to avoid the more obvious ways of spreading infection. The author rejects the old theory that it is due to a fungus, *Pumilus medullae*, and a more recent one attributing it to a virus spread by *Phylloxera*.

1360. NYSTERAKIS, F. 634.8-2.8
Phylloxera vitifolii Fitch est-il le vecteur naturel de l'agent pathogène du court-noué contagieux de la vigne ? **(Is phylloxera the natural vector of court-noué of the grapevine ?)**
C.R. Acad. Agric. Fr., 1946, **32**: 326-8.
The experiments described offer no evidence that phylloxera is the vector of the pathogenic agent of court-noué.

1361. BRANAS, J., BERNON, G., AND LEVADOUX, L. 634.8-2.8
Nouvelles observations sur la transmission du court-noué de la vigne. **(New observations on the transmission of court-noué of the grape vine.)**
Progr. agric. vitic., 1946, **125**: 42-8, 82-3.
From experiments described it would appear that radicicolous phylloxeras taken from plants with court-noué are able to transmit the disease to healthy plants, that gallicolous phylloxeras from infected plants give the same result, and that the effect of the contamination with the radicicolous insects depends on the number capable of active attack.

1362. HEWITT, W. B., AND OTHERS. 634.8-2.8
Leafhopper transmission of the virus causing Pierce's disease of grape and dwarf of alfalfa.
Phytopathology, 1946, **36**: 117-28.
Pierce's disease of grapevines was usually more prevalent in vineyards of districts where considerable alfalfa was grown and in portions of vineyards adjacent to alfalfa. The same four species of leafhoppers, viz. *Draeculacephala minerva* Ball, *Carneocephala fulgida* Nott., *Helochara delta* Oman and *Neokolla circellata* (Baker), that transmitted the alfalfa dwarf virus were at the same time proved capable of transmitting the virus of Pierce's disease. From the intertransmission experiments it was shown that the virus that causes Pierce's disease of grapes also causes dwarf of alfalfa.

1363. HUS, P. 634.22-2.3
Zieke pruimeboomen. **(A plum tree disease.)**
Meded. Direct. Tuinb. 1946, pp. 485-6.
A disease of young plum trees, associated with gumming and a discoloration of the bark, is described. The trees either die suddenly without any previous symptoms or they die more gradually, beginning with one or several branches. In the former case *Pseudomonas mors-prunorum* is suggested as the cause, in the latter *P. spongiosus*, but no proof of this has yet been obtained. The disease effects the scion only, the rootstock remaining sound. It is recommended, therefore, that the diseased scion be cut away and the rootstock regrafted the following year.

1364. WORMALD, H. 634.13-2.3
Pear blossom blight.
J. Pomol., 1946, **22**: 41-5, bibl. 14.
Bacterial blossom blight of pears in east and south-east England is caused mostly by *Pseudomonas prunicola*, though two other organisms have been isolated and found to be pathogenic. Bacterial leaf spot and fruit spot are also caused by *P. prunicola*. All infected inflorescences should be cut out as soon as possible after an outbreak has been noticed.

1365. HEIM, R. (SACCAS, A.). 632.42: 634.1
Les tavelures des rosacées. **(The scab diseases of rosaceous plants.)**
C.R. Acad. Fr., 1945, **31**: 479-80.
This is a review of a thesis by one of the author's students on the scab diseases of apples, pears and *Crataegus pyracantha* —Athanase Saccas.—Étude morphologique et biologique des *Fusicladium* des Rosacées (317 pp., 59 fig., 2 pl., Le François éd., Paris, 1944).

1366. PALMITER, D. H. 634.11-2.42
Ground treatments as an aid in apple scab control.
Bull. N. York St. agric. Exp. Stat. **714**, 1946, pp. 27.

Apple scab control experiments indicate that the amount of primary inoculum (spores of *Venturia inaequalis* in overwintered apple leaves) in a year favorable for disease development may determine the success or failure of the scab control program. Orchards in which less than 5% of the old leaves contained spores were well protected from apple scab infection with from five to seven applications of wettable sulfur. Similar orchards with more abundant inoculum required extra fungicidal applications and higher concentrations of sulfur for equal disease control. Nine years of laboratory tests and field experiments showed the effectiveness of certain chemicals in killing or preventing the discharge of ascospores of the scab fungus. Nitrogen fertilizers, such as nitrate of soda and sulfate of ammonia used at 12% concentration, were effective, but the 500 to 600 lb. required per acre for effective coverage increased the nitrogen supply available to the trees beyond the optimum amount for best fruit quality. Elgetol used at 2 quarts to 100 gallons reduced the primary inoculum more than 95% when carefully applied and resulted in improved scab control. The ground treatments were most effective in years of excessive rainfall, like 1943 and 1945, and reduced the amount of fruit infection on trees receiving a wettable sulfur program from 20% to 2%. [Author's abstract.]

1367. KEITT, G. W., AND MOORE, J. D. 634.11-2.42
Apple scab control experiments with ground and tree spraying for 1945.
Wis. Hort., 1946, **36**: 166-7, 177.

In this account of scab control experiments, particular attention is given to ground spraying, using 1 gal. of Elgetol to 200 gal. water, applied at the rate of 600 gal. per acre with a spray boom. This boom (illustrated) has been improved by substituting a double castor wheel carrier for the shoe on which the boom rode, in order to give more freedom in turning and backing. The ground spray should be applied in the spring after the ground is in suitable condition and before the buds have broken enough to expose tissues susceptible to scab infection. If the ground spray is applied by means of a spray boom, it will usually be found most practical to treat the area between two rows of trees in two trips. The boom is attached in such a way that the rig can be driven in each direction right down the middle of the area between two rows of trees, and the nozzles are placed so that there will be about a foot to a foot and a half of overlapping coverage at each edge of every sprayed strip. The ground spray can be applied to small acreages by means of spray guns.

1368. DAINES, R. H. 634.11-2.42
Experiments with new organic fungicides for control of apple scab and Brooks' fruit spot (*Phoma pomi*).
Phytopathology, 1946, **36**: 236-7.

Satisfactory control of apple scab is recorded for preparations containing 2,3-dichloro-1,4-naphthoquinone and phenyl mercuri triethanol ammonium lactate, and Fermate (ferric dimethyl dithiocarbamate) and Isothan Q-15 (lauryl isoquinolinum bromide), but not for He 175 (disodium ethylene bisdithiocarbamate). Excellent control of Brooks' fruit spot was obtained with Thiosan (tetramethylthiuram disulphide) and lead dimethyl dithiocarbamate.

1369. SCHAD, C. 632.42: 634.1
Possibilité d'organiser un service d'avertissements contre la tavelure du pommier et du poirier. **(Warning systems for scab control.)**
Ann. Épiphyt., 1943, **9**: 11-7, bibl. 29.

The application of fungicides against apple and pear scab should be based on the dissemination of ascospores. Because of the inconsistency of timing between the maturing of the perithecia and the appearance of leaves and flowers of apple and pear, the trees can be attacked from the pre-budburst stage to the time of flowering, according to the season. It is possible to organize in France a service for advising growers when to expect scab infection to start and so when to spray, based on the determination of the maturity of the perithecia and liberation of spores. Such an organization includes establishing observation posts for recording meteorological and biological conditions in various apple and pear growing districts. At each of these posts scabbed leaves are collected in autumn and placed on the ground in an open place. From the month of March onwards samples of the leaves are sent to the central station for examination as to the state of development of the perithecia, the time of spore emission, and the germinative energy of the spores. In this way it is possible to give warning in each region as to the critical period of ascospore emission and to indicate the best times for applying treatment. The service has already been started in some districts and it is in course of extension.

1370. VAN DER POL, P. H. 632.42: 634.11 +634.13
Een aanvullende bespuiting ter bestrijding van appel-en pereschurft. **(A supplementary spraying against apple and pear scab.)**
Meded. Direct. Tuinb., 1946, pp. 334-6.

Laboratory experiments confirmed results obtained in America and New South Wales that spraying apple leaves with D.N.C. preparations caused a considerable reduction in the number of ascospores discharged from the perithecia. Whether equally successful results would attend "ground spraying" in Holland as in America is doubtful, since the cultivation of the soil tends to eliminate the leaves. It might, however, prove to be a useful supplement to the ordinary routine measures.

1371. MULDER, D. 632.42: 634.11 +634.13
Proeven over schurftbestrijding, in het bijzonder aangaande de voorraadsbespuiting, de bespuiting tijdens den bloei en de keuze van het zomerbestrijdingsmiddel (1944). **(Experiment on scab control, with particular reference to pre-budburst spraying, spraying during blossoming and the choice of substances for summer spraying.)**
Meded. Direct. Tuinb., 1946, pp. 337-49.

Pre-budburst application of 5% bordeaux mixture or other copper-containing spray has no special advantage with regard to scab control over the routine two applications of 1½% bordeaux mixture, but the economy of labour and petrol must, however, be considered. When it is possible to do it the result is not worse than by the usual method. On the question of spraying according to the stage of development of the buds or to the discharge of the ascospores the experiments gave no definite answer. In two experiments on pears ascospore-spraying gave results as good as those from bud-development spraying, on the other much better control. In an experiment on apples three-times ascospore-spraying gave better results than twice bud spraying. Three-times spraying before blossoming is better than twice spraying, but the economic factor has to be considered. On varieties that are not very sensitive to copper there is hardly any copper damage from spraying during blossoming and there is no diminution of crop. Sulphur-containing summer sprays sometimes give incomplete control, if severe infection occurs in early summer. The experiments show that the products Pomarsol and Nosprasit as summer sprays give much better control than the inorganic and colloidal sulphur sprays. Both, however, have the disadvantage that they have no effect against red spider. Moreover, Nosprasit cannot be used on certain varieties because of the damage it causes. Pomarsol is an organic sulphur preparation and its mixing with mineral oils is probably dangerous.

1372. Moore, M. H., and Pearce, S. C. 634.11-2.42
The personal factor in routine spraying. I. A preliminary trial on apple scab.
J. Pomol., 1946, **22**: 62-8, bibl. 8.

As the results of spraying trials against apple scab often show very erratic variation, the matter was tested by comparing routine spraying (by an experienced farm hand) with specially thorough application in which every branch was meticulously sprayed. The sprays were applied as follows: *green cluster*, lime-sulphur 1%; *pink bud*, lime-sulphur 1%; *petal fall*, lime-sulphur 1%; *fruitlet*, lime-sulphur 0·5% and colloidal sulphur 0·3% with spreader. Insecticides were added when necessary. It was found that (1) thorough spraying lowered tree-to-tree variability in scab control, and thus reduced experimental error, (2) specially thorough spraying improved scab control when compared with ordinary routine spraying, (3) individual workers varied in the efficacy of their routine spraying. Thorough spraying gave significantly better scab control on leaves and fruits when infection was measured by percentage, but not when measured by mean area of infection per leaf or fruit.

1373. Spoor, P. A. 634.11/13-2.42
Schurftbestrijding. **(Scab control.)**
Fruitteelt, 1946, Jg. 36, pp. 78-9.

The timing of the application of sprays against apple and pear scab according to (1) the ascospore method, i.e. the time of ascospore discharge from the perithecia on the fallen leaves, and (2) the bud stage method, are compared. The results of spraying by the two methods on pears and apples over a period of four years (1941-4) are tabulated. The author concludes that the ascospore method, although theoretically very good, offers practical difficulties and is not reliable. He advocates spraying (pre-blossom) at the green-bud and the pink-bud stages.

1374. Mulder, D. 632.42: 634.11/13
Enkele opmerkingen over de schurftbestrijding. **(Remarks on scab control.)**
Fruitteelt, 1946, Jg. 36, p. 80.

This article, written with reference to the paper by Spoor (see above), points out how precarious the results of spraying may be and questions the conclusions drawn from the results of the years 1941-1944. It is emphasized that infection depends on three factors, (1) the number of ascospores in the air, (2) the area of leaf-surface exposed to infection, and (3) weather conditions favourable for infection. To predict when these three will coincide is impossible. The ascospore discharge, however, must be taken into consideration for the critical period, for primary infection is during the period of ascospore dispersal. The beginning of this period will start when the ascospores are beginning to be shot out; this sometimes coincides with the opening of the buds in early seasons. In most years the very earliest ascospores take no part in infection. Ascospore discharge thus indicates when spraying should start. The end of the critical period is about blossoming time or soon after. As spraying during the blossoming period is not generally practised, there is risk of infection from late ascospores.

1375. van de Pol, P. H. 634.11-2.42 +2.76
Het combineeren van de winterbespuiting met die tegen de schurftziekte en tegen den appelbloesemkever. **(Combining winter spraying with the control of scab and apple blossom weevil.)**
Fruitteelt, 1946, Jg. 36, pp. 80-1.

Late winter spraying, at a stage when the buds are just beginning to swell, is advocated, for it can be combined with scab or weevil control. Against scab, mineral oil or tar-oil can be combined with bordeaux mixture or one of the copper oxychloride preparations. For weevil control tar-oil with 1% Gesarol-DDT is recommended. [See also *H.A.*, 16: 813.]

1376. Wilson, E. E., and Baker, G. A. 632.42
Some aspects of the aerial dissemination of spores, with special reference to conidia of *Sclerotinia laxa*.
J. agric. Res., 1946, **72**: 301-27, bibl. 20.

Conidia of *Sclerotinia laxa*, the cause of blossom wilt in stone-fruit trees, are produced in large numbers during late winter on blossoms and twigs infected the previous spring. These are detached from the sporophores by winds of low velocity and, judging from their rate of fall in still air, are readily transported by air currents. Attempts were made to determine the major factors influencing wind dissemination of spores, and to correlate the results with the data on disease spread. From the results of their observations and the mathematical treatment of the data the authors conclude that, "though the results of this treatment must remain provisional, the observed spread of the disease through the apricot orchards is described to a good first approximation by an equation of the form $y=A/x^p$ where y is the ratio of the percentage of blossom infection in a vertical slice of susceptible tissue (blossom) at a horizontal distance from the source block to the percentage of blossom infection in the source trees, A and p are constants depending on wind velocity and perhaps on other quantities to a lesser extent, and x is the horizontal distance from the centre of the nearest source trees.

1377. Bliss, D. E. 632.4: 634.1/3
The relation of soil temperature to the development of *Armillaria* root rot.
Phytopathology, 1946, **36**: 302-18, bibl. 9.

Sweet orange, sour orange, peach and apricot were among the plants used in the experiments described. Pathogenesis in test plants was observed at soil temperatures ranging from 7° to 25° C., inclusive. The maximum temperature was between 25° and 27°; the minimum somewhat below 7°. Greatest resistance was shown by all plants at temperatures most favourable to root growth. The relation of soil temperature to the development of the root rot was clearly shown in an experiment with peaches, apricots, and geraniums, three very susceptible species; they were infected at 10° C., more severely infected at 17° and 24° (most of the plants dying during the experiment), and escaped infection at 31° and 38°; at 38°, however, the plants died from excessive heat.

1378. Rosella, E. 634.25-2.4
Contre la cloque du pêcher. Les traitements d'hiver tardifs sont efficaces. **(Late winter control measures for peach leaf curl.)**
Progr. agric. vitic., 1946, **125**: 207-8.

Late winter treatment (in January) is recommended for peach leaf curl using bordeaux mixture (2% copper sulphate), or copper oxychloride at 1 to 1·5%. Lime-sulphur, and baryta-sulphur may also be used. Baryta-sulphur sprays at 3% have been found to give results as good as those with bordeaux mixture.

1379. Johnson, F. 634.711-2.44
Physiologic races of yellow-rust of raspberries in western Washington.
Phytopathology, 1946, **36**: 383-4.

Experiments and observations suggest that there are two distinct physiologic races of *Phragmidium rubi-idaei* in western Washington. Both Cuthbert and Washington raspberries are susceptible to the rust present on the latter variety in Whatcom County, while Washington is resistant to the race collected from Marlboro and Cuthbert in the Puyallup Valley.

1380. Wilkinson, E. H. 634.11-2.48
Observations on the perennial canker fungus, *Gloeosporium perennans* Zeller & Childs.
Trans. Brit. myc. Soc., 1945, **28**: 77-85, bibl. 13.

Further observations and experiments on the perennial canker fungus are described (see *H.A.*, 15: 563). Cross inoculations demonstrated the identity of the fungus

causing branch lesions with that infecting fruits. Infection experiments showed that the fungus is an active wound parasite of apple branches, but is unable to penetrate uninjured bark; it cannot penetrate the unbroken skin of the fruit but can traverse the skin through a lenticel.

1381. ARNAUD, G. 632.3/4: 632.952
Essais de traitement des maladies des plantes en 1941. **(Trials for the control of diseases in 1941.)**
Ann. Épiphyt., 1942, **8**: 99-109.

Includes notes on results against mildew and oidium of the vine. For the former it was found that copper in some form is indispensable and that Bordeaux mixture is most effective. As the copper sulphate is reduced below 2% so is the efficacy of the mixture reduced. With regard to oidium, flowers of sulphur gave the best results of a number of preparations used.

1382. SCHAD, C. 634.8-2.4
Étude des facteurs de l'infection primaire et de la durée de l'incubation en vue de la prévision des époques de traitements contre le mildiou de la vigne. **(A study of the factors of primary infection and duration of incubation, for the purpose of timing treatments against vine mildew.)**
Ann. Épiphyt., 1943, **9**: 19-25.

The method of issuing warnings to growers at Clermont-Ferrand (central France) has already given noticeable results in the control of vine mildew. The further data obtained on primary infections and period of incubation allow of giving more exact advice on when to apply treatments and of reducing the number of applications while still maintaining perfect protection in the vineyard.

1383. MOREAU, L., VINET, E., AND SIMON, —. 634.8-2.4
L'oïdium en 1942 au vignoble expérimental de Belle-Beille. **(Oidium in 1942 in the experimental vineyard of Belle-Beille.)**
Ann. Épiphyt., 1943, **9**: 131-3.

From the results of these experiments it is concluded that the addition of potassium permanganate to a copper-arsenical spray for the first two applications offers good control of vine oidium [*Uncinula necator*]. In 1942 those measures allowed the omission of sulphuring. Bordeaux mixture (1% copper sulphate) with a wetter had an appreciable effect against oidium. When the foliage is thick it is necessary to remove leaves to the level of the bunches of grapes on the east side during July. The use of bituminous sulphur (12-16% sulphur), after spraying with potassium permanganate, has given satisfactory results on vines already attacked.

1384. BARRAUD, M., GAUDINEAU, M., AND DE SÈZE, R. 634.8-2.4
Essais de traitement du mildiou de la vigne en 1942 à la Grande-Ferrade (Gironde). **(Trials against vine mildew in 1942 at Grande Ferrade.)**
Ann. Épiphyt., 1943, **9**: 135-59.

Trials for the control of vine mildew [*Plasmopara viticola*] are described. Bordeaux at 2% (copper sulphate) gave inconsistent results, at 1% control was inferior but sufficient, while at 0·2% it was clearly not effective enough; 0·5% appears to be the limit of effectiveness. Bordeaux mixture at 1% with the addition of alkylxanthate of soda was found to be about as effective as the 2% mixture without it. Solutions of copper sulphate and of copper ammoniate gave insufficient protection. Certain products with cipher names have promising results.

1385. GAUDINEAU, M., AND DE SÈZE, R. 634.8-2.4
Essais de lutte contre le mildiou et l'oïdium de la vigne en 1943.**(Trials for combating vine mildew and oidium in 1943.)**
Ann. Épiphyt., 1944, **10**: 65-83.

The fungicides used against mildew contained copper in some form or other except one preparation containing an organic-zinc preparation. Bordeaux mixture at 2% copper sulphate yielded better results than the mixtures with lower concentrations of copper sulphate. The zinc preparation gave promising results and is deemed worthy of further attention. Against oidium, flowers of sulphur gave practically complete protection, sulphur with bentonite gave satisfactory results, and one colloidal sulphur preparation gave good results, while others were insufficiently effective.

1386. MAURO, J., AND CHAPPAZ, G. 634.8-2.4
Observation sur les perithèces de l'oïdium de la vigne en Champagne. **(The perithecia of the vine oidium seen in Champagne.)**
C.R. Acad. Agric. Fr., 1945, **31**: 285-6.

The perfect stage (*Uncinula necator*) of the vine oidium is recorded as found in the Champagne district of France in 1943 and 1944.

1387. GAUDINEAU, M., AND BARRAUD, M. 634.8-2.4
Années à faible mildiou et traitements des vignes. **(Treatment of vines in years of little mildew.)**
C.R. Acad. Agric. Fr., 1946, **32**: 30-3.

In south-west France 1944 and 1945 were years when there was little vine mildew. In such years bordeaux mixtures at 1%, 2% and 4% are practically equally effective. To retain the foliage and ensure ripening of the wood under these conditions one application of a spray of low copper content is recommended.

1388. BRUNETEAU, —., AND ROUSSEL, —. 634.8-2.4
Sur l'évolution du black-rot de la vigne et la possibilfté d'organisation d'un service d'avertissements contre cette maladie. **(The possibility of organizing a warning service against black rot of the vine.)**
C.R. Acad. Agric. Fr., 1946, **32**: 28-30.

In recent years black rot of grapes [*Guignardia bidwellii*] has been increasing in south-west France, chiefly because of the scarcity of copper and a tendency to omit the early sprayings against mildew. Early sprayings are necessary for the control of black rot and the authors discuss the possibility of timing the spraying according to the stage of development of the fungus in spring. Observations were made on the conidial and perithecial stages of the fungus on infected overwintered fruits, and sprayings were so timed as to be effective when the spores were being shed. On such observations it would appear possible to advise growers as to the best times for spraying, but at present prophylactic measures and early spraying with copper preparations are advocated.

1389. FRANÇÔT, —., AND LEVADOUX, —. 634.8-2.4
Observations faites en 1945 sur le brenner ou rougeot parasitaire de la vigne. **(Observations in 1945 on the " rote brenner " of vines.)**
C.R. Acad. Agric. Fr., 1946, **31**: 43-5.

Observations in 1945 on " rote brenner " or " rougeot " of the vine [*Pseudopeziza tracheiphila*] showed that it could be controlled along the same lines as those recommended for mildew, i.e. (1) The control must aim at prevention, (2) the date of the first application of a fungicide must be based on the stage of development of the apothecia and the conditions necessary for the germination of the spores, (3) the number of applications and the intervals between them must be in relation to the rate of growth of the shoots during the dangerous period. [See *H.A.*, 15: 1580 and 1590.]

1390. KUHNHOLTZ-LORDAT, M. 634.53-2.4
Considérations générales sur le dépérissement des châtaigneraies cévenoles et suggestions d'ordre pratique qui peuvent en découler. **(General observations on the decay of chestnuts in the Cevennes and practical suggestions thereon.)**
Ann. Épiphyt., 1944, **10**: 25-53.

The author points out that in the Cevennes the decay and

death of chestnuts are not solely due to ink disease and the general use of this term for the diseases of chestnuts in that region leads to confusion. Three primary symptoms are to be recognized, viz. chlorosis, running off, and fire, and secondary symptoms are stag-headedness and ink symptoms. The cause of ink disease is *Phytophthora cambivora*, but root rot can also be caused by *Armillaria mellea*. Cultivation, plant sanitation and grafting are discussed, and a programme for further action against the diseases is set out.

1391. JENKINS, C. F. H. 632.728
Grasshoppers and locusts in Western Australia.
J. Agric. W. Aust., 1945, **22**: 322-31.

The most important grasshopper in Western Australia is the small plague grasshopper, *Austroicetes cruciata* Sauss. A general description of the pest and its habits is given; other grasshoppers and locusts of importance in the State are: the Australia plague locust (*Chortoicetes terminifera* Walk.), the wingless grasshopper (*Phaulacridium vittatum* Sjost.), the yellow winged locust (*Gastrimargus musicus* Fabr.), the spur-throated locust (*Austracris guttulosa* Walk.) and long-horned grasshoppers. Control measures are discussed under (*a*) *Cultural methods*—Heavy timber growth and a profusion of ground cover are unfavourable for the breeding of the small plague grasshopper and consequently the needless clearing and ring-barking of land in the grasshopper belt are to be deprecated. (*b*) *Non-poisonous sprays*—Carbolic or washing soap at 2½ oz. per gal. of hot water is very effective against young hoppers. (*c*) *Poison sprays*—(1) arsenite of soda, 1 lb.; molasses, 4 lb.; water, 14 gal.; this should not be applied to cultivated crops. (2) arsenate of lead powder 1 oz., or arsenate of lead paste, 2 oz.; water, 1 gal.; this will not damage vegetables or fruit trees. (*d*) *Poison bait*—bran, 25 lb.; arsenite of soda, ½ lb. (80% arsenious oxide); molasses, 6 lb.; water, 2½ gal. Machines for mixing and spreading the bait are illustrated. When fruit and vegetables are sprayed they should be thoroughly washed to remove all traces of poison before being used as food.

1392. NEPVEU, P. 632.752
Remarques sur les dégâts du pou de San José. **(Remarks on the damage caused by the San José scale.)**
Ann. Épiphyt., 1943, **9**: 235-51.

Observations carried out on peach trees in the Siagne valley (Maritime Alps) are described; the damage caused by the San José scale is shown by illustrations and diagrams. The effect of the attack on peach trees is (1) to reduce the length of the branches rather than their number if the attack is not too severe, (2) to reduce the amount of foliage, (3) to diminish the foliocortical relation, which, if it falls to about one-fifth normal during the course of the year, results in the death of the tree. The foliocortical index (relation of total leaf area to cortical surface area) allows of a simple expression of the damage, taking into consideration the size of the tree.

1393. BRUNETEAU, J. 632.752
La lutte contre le pou de San José aux États-unis d'Amérique et en Europe centrale jusqu'en 1939. **(Combating the San José scale in the United States and in Central Europe up to 1939.)**
Ann. Épiphyt., 1943, **9**: 221-31, bibl. 70.

In reviewing the work that has been done on the control of the San José scale (*Quadraspidiotus perniciosus* Comst.) the author summarizes as follows: In the United States lime-sulphur was first used, then mineral oils, and now commercial products of white oils; several applications in winter and summer are necessary. In central Europe tar-oil is applied in winter, followed by nicotine in spring. For fumigating nursery plants, hydrocyanic vapour is employed. Research in recent years has shown the efficacy of other products, particularly hydrogen sulphide, ethylene oxide and methyl bromide.

1394. DAVIS, L. G. 634.13-2.752
Pear psylla control in 1945.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 143-9.

The article starts with an account of survey work on pear psylla in the Pacific northwest, the results being summarized in tables. The control programme for 1945 included two major changes from that of previous years: (1) no sprays were applied during the dormant season, and (2) there was a general reduction in the size of the spray area surrounding many of the infestations, in most cases to a circle having a radius of half a mile.

1395. COUPIN, A. 634.836.7
Où en est le phylloxéra ? Où en sommes nous de la réconstitution ? **(The phylloxera position in Tunisia and progress in vineyard reconstruction.)**
Tunis. agric., 1942, **43**: 39-50.

It is obvious from this article that phylloxera was rampant in the vineyards of Tunisia in 1942, that there was urgent necessity for grubbing the vines and replanting on American stocks well tested in France, but that there was considerable ignorance as to the best procedure.

1396. BALACHOWSKY, A. 632.754: 634.1/2
Biologie et dégâts de la cicadelle verte (*Tettigoniella viridis* L.) en France. **(The biology of *T. viridis* and the damage it causes.)**
Ann. Épiphyt., 1941, **7**: 65-83, bibl. 12.

This article records further observations (see *H.A.*, 7: 360) on this jassid insect. Fruit trees can be protected from the pest by growing them as standard trees so that grease bands can be applied to the stems at 1 m. to 1·2 m. above soil level; they should be put in place at the beginning of September. These measures can be supplemented by putting round the base of the tree for a radius of 4-5 metres substances repellant to the insects, such as carbolineum (20%) or crude naphthalene, according to whether or not the grower is prepared to sacrifice cover crops.

1397. HAMMOND, G. H. 632.76
How to foretell and control outbreaks of white grubs.
Processed Publ. Dep. Agric. Canada Div. Ent. **42**, 1946, pp. 5.

The complicated life history of the white grub, the larval stage of the June beetle, is elaborated. In large sections of eastern Canada more study is required to determine outbreaks in advance, i.e. the year of occurrence of the most destructive phase in the life cycle, when the grubs are in their second year. The pest should be controlled by spraying lead arsenate on to the foliage of June beetle food trees or shrubs. Applications are made about 20 May of a June beetle flight year.

1398. CHABOUSSOU, —. 634.1/7-2.76
Sur deux rynchites (*R. Bacchus* L. et *R. aequatus* L.) nuisibles aux arbres fruitiers en Agenais. **(Two rhynchites as pests of fruit trees in Agen.)**
C.R. Acad. Agric. Fr., 1945, **31**: 110-2.

Rhynchites bacchus and *R. aequatus* are important fruit tree pests in Agen (south-west France), attacking particularly the d'Ente prune. Moreover *R. bacchus* is found to be one of the chief agents in the dissemination of the brown rot fungus (*Sclerotinia fructigena*). Invasion by the fungus following oviposition is to be seen on all fruits, but it is particularly severe on the d'Ente prune and on the nectarine. It is asserted, therefore, that the application of fungicides for the control of brown rot of the fruit is useless unless at the same time the rhynchites are controlled.

1399. DICKER, G. H. L. 634.11-2.76
The apple blossom weevil and its control.
Gdnrs' Chron., 1946, **119**: 118.

The most important discovery during recent observations

has been the actual time of egg laying; this begins when the fruit buds reach the bud-burst stage, which, in a normal season, occurs during the last week of March or first in April. Growers can now be advised to time their sprays according to the condition of the tree, and not by date. Our present knowledge allows of two recommendations for the control of apple blossom weevil, both of which seem equally effective and choice depends largely on equipment and labour available: (1) Dust with 5% DDT at bud-burst and again a week later, using about 45 to 50 lb. per acre each time, or (2) spray with 0·1% DDT wash at bud-burst. The effect of DDT on beneficial insects is being studied; the sprays or dusts used for apple blossom weevil are unlikely to have any material effect on these insects if applied at the correct time, for very few of them are about on the trees at the bud-burst stage.

1400. GRISON, P., AND CHEVALIER, M. 634.11-2.76
Relations écologiques entre la ponte de l'anthonome du pommier (*Anthonomus pomorum* L.), le climat et le développement végétatif préfloral du pommier. **(The ecological relations between oviposition of the apple blossom weevil, climate and the preblossom development of the apple.)**
C.R. Acad. Agric. Fr., 1946, **32**: 195-8.

The infestation of the flower buds by the eggs of the apple blossom weevil starts when the swelling of the spur buds begins, and ends when the flower buds show. The intensity of infestation of the buds depends on temperature which regulates the activity of the insects and, to a large extent, the duration of the receptive stages of varieties. Changes in temperature do not induce the same accelerations and retardations in the development of different varieties as on the activity of the weevils. There are thus great variations in the number of ovipositions on the same variety, according to locality and year.

1401. CHEVALIER, M., AND BEAUGENDRE, R. 634.11-2.76
L'anthonome du pommier (*Anthonomus pomorum* L.) et la production des pommes dans le département de la Sarthe. **(Apple blossom weevil and the apple crop in the Sarthe Department.)**
C.R. Acad. Agric. Fr., 1946, **32**: 198-203.

All varieties of apples grown in the Sarthe Department can be attacked by the apple blossom weevil, but not uniformly, the variations being due to the variety (those varieties that develop quickly and homogeneously are least susceptible), to the surrounding of the plantations (woods, hedges), and to the climatic conditions of the situation and of the season—the periods of egg-laying do not vary parallel with the periods of blossoming. The multiplication of the weevils becomes less rapid in plantations of varieties that come into leaf about the same time or are planted in rows. In sheltered spots, on the borders of woods, only late-leafing varieties should be planted, so as not to provide the conditions most suitable for the reproduction of the weevil. The appearance of the weevil on early-leafing varieties should be carefully noted. From the time of its appearance all trees that are in a stage suitable for oviposition should be treated, thus destroying large numbers of weevils and preventing them from going from one variety to another. The treatments should be applied between the first pairings and oviposition, that is about a week after the weevils appear.

1402. M., H. A. 634.75-2.76
The strawberry blossom weevil.
Gdnrs' Chron., 1946, **119**: 211.

The life history of the strawberry blossom weevil or "Elephant Fly", *Anthonomous rubi* Herbst, is outlined and methods of control, by poison baits, dusts and sprays are discussed. Cleanliness and hygiene are important factors in preventing serious outbreaks.

1403. SCHOENE, W. J. 632.76: 634.22+634.25
A comparison of acid and basic arsenate of lead on peach for plum curculio.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 148-51.

Acid proved more effective than basic lead arsenate in a severe infestation by plum curculio, but it also caused more damage to the fruiting wood of the peach. The use of zinc sulphate and lime reduced the injury.

1404. EIDE, P. M. 634.23-2.77
The cherry fruitfly problem in eastern Washington.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 55-61.

The white banded cherry fruit fly, *Rhagoletis cingulata* Loew, is described and its life history outlined. Growers are advised to ascertain when the flies emerge from the pupae, and a trapping cage for the purpose is described. The first appearance of the flies should be noted and the first spray applied a week later. In experiments with various sprays and dusts, DDT proved a failure. Good control was obtained with phenothiazine, but at present growers are advised to rely on rotenone-containing sprays.

1405. BENNETT, S. H., AND KEARNS, H. G. H. 634.13-2.77
An experiment on the control of pear midge (*Contarinia pyrivora*).
J. Pomol., 1946, **22**: 38-40, bibl. 4.

Tar oil and DNC petroleum emulsions applied to the soil at the rates of 900-1,200 gal. per acre between bud-burst and immediately before the white bud stage provided a high control of pear midge (*Contarinia pyrivora*). The treatments resulted in 46-101% increase in number of fruits harvested and 31-53% increase in crop weight. The increase in numbers of harvested fruits resulted in smaller pears, and to obtain larger fruit it would have been necessary to thin the crops when the soil treatments were carried out.

1406. SHAW, J. G., AND STARR, D. F. 632.77: 581.036
Development of the immature stages of *Anastrepha serpentina* in relation to temperature.
J. agric. Res., 1946, **72**: 265-76.

The hosts of this fruit fly in Mexico are chicozapote (*Achras zapota* L.), zapote mamey (*Calocarpum mammosum* (L) Pierre), and peach (*Prunus persica* (L.) Stokes). In recent years it has been found in citrus groves of Texas and Mexico. The development of its immature stages was studied. Moulting of the first instar was observed in some detail. The second stadium was generally shorter than the first, but the third was considerably longer than either of the others. Holding and caring for puparia in crystallization dishes is described. The development time was nearly the same for puparia formed from larvae fed on peach and on chicozapote, the difference being in the feeding or larval stage. When the rate of development in each fruit, measured by the reciprocal of time in days, was plotted against temperature, linear regression lines were produced.

1407. LENFANT, —., AND COUTURIER, —. 634.25-2.78
Sur la présence de la tordeuse orientale du pêcher (*Laspeyresia molesta* Busck) dans le sud-ouest de la France. **(The oriental peach moth in south-western France.)**
C.R. Acad. Agric. Fr., 1945, **31**: 196-8.

The appearance of the oriental peach moth is recorded for south-west France. It has been found in recent years in certain plantations in the Garonne valley between Toulouse and Bordeaux. In spring the caterpillar enters the terminal shoots of the young scions, and the terminal parts wilt and exude gum. [See also *H.A.*, 8: 448 and 9: 1245.]

1408. Steiner, L. F., Summerland, S. A., and Fahey, J. E. 632.951: 632.78
Experiments with DDT for codling moth control at the Vincennes, Indiana, Laboratory.
Proc. Pa St. hort. Ass. 86th annu. Meet. 1945, pp. 76-94 and *Proc. 68th Conv. Amer. pomol. Soc.*, Dec. 1944, pp. 164-78.

In large-scale tests at Vincennes in 1943 and 1944 DDT sprays at 1 lb. per 100 gallons were more effective than the standard nicotine bentonite programme (1 pint nicotine sulphate [40% nicotine] per 100 gallons) and in small plot field tests they gave much better control than standard lead arsenate (4 and 3 lb. per 100 gallons). It is reported to be an excellent supplement to small quantities of either of these sprays. It can be used effectively with summer oils and bordeaux. The DDT received varied greatly in physical properties. Given at certain dosages against codling moth it favoured a serious increase in red spider. It proved very effective against apple leaf hoppers and showed promise against several apple aphids.

1409. Siegler, E. H. 632.78
Susceptibility of hibernating codling moth larvae to low temperatures, and the bound-water content.
J. agric. Res., 1946, **72**: 329-40, bibl. 13.

The codling moth is able to survive under a diversity of climatic conditions, particularly low winter temperatures, but at times overwintering larvae are killed by exposure to low temperatures, and the susceptibility of the hibernating larvae to low temperatures has been investigated as indicated by the temperature to which the insect can be undercooled before beginning to freeze. Studies have been made of the bound-water (water absorbed by hydrophilic colloids) content of hibernating larvae. Unlike some insects, the codling moth cannot withstand more than one freezing. The overwintering larva shows a pronounced tendency to undercool. The average undercooling temperatures for different groups of larvae ranged from $-24{\cdot}4°$ C. to $-11{\cdot}2°$ C. Undercooling is favoured by the quiescent state of the larva during its hibernation period. The artificial movement of the larva greatly reduced undercooling. The average bound-water content of codling moth larvae was 35·9% when determined by the dilatometric method at $-7{\cdot}5°$ C., and 11·2% by the heat-of-fusion-of-ice method at $-30°$ C.

1410. Ross, W. A., and Armstrong, T. 634.13-2.95
Spray schedules for pear orchards especially subject to pear psylla and codling moth.
Processed Publ. Dep. Agric. Canada Div. Ent. **40**, 1946, pp. 2.

There are two schedules according to whether dormant spray is applied or not.

1411. Grison, P., and Chevalier, M. 634.11-2.78
Observations sur le cycle de développement du bombyx cul-brun (*Euproctis phaeorrhaea* Don) sur le pommier et dans la région parisienne en 1945. **(On the life cycle of the brown tail moth on apple and its occurrence around Paris in 1945.)**
C.R. Acad. Agric. Fr., 1946, **32**: 272-3.

The caterpillars of the brown tail moth develop at different rates on different hosts. According to the authors' observations it prefers the apple to the oak. At Versailles in 1945 damage was caused from 16 March to 15 June. The incubation period is about 4 weeks. The activity of the caterpillars before entering the diapause is observable the same year, for 6 to 7 weeks, and they hibernate at the beginning of the third larval stage.

1412. Paillot, A. 634.8-2.78
La lutte contre la cochylis et l'eudemis de la vigne. **(Combating cochylis and eudemis of the grape vine.)**
Ann. Épiphyt., 1942, **8**: 121-76, bibl. 34.

Temperature and moisture have great influence on the development of cochylis [*Clysia ambiguella*] and eudemis [*Polychrosis botrana*]. Variation in these factors from place to place explains the differences recorded for the emergence of the moths. Observations during three years have shown that the emergence of the cochylis moths of the spring brood is particularly affected by the average temperature during March, that of the eudemis moths by the weather conditions during the last days of the nymph stage. The life cycle of cochylis is much more independent of environmental conditions than that of eudemis, particularly with regard to temperature. In the biological control of cochylis and eudemis hymenopterous and dipterous parasites are of little importance. No bacterial infection of the pests has been observed, but attacks by fungi are frequent in winter and the proportion of chrysalids killed by them may be important. Among the insecticides that can be used against these moths lead arsenate, aluminium arsenate and synthetic cryolite have given the best results. Of the dusts tried against the larvae of the second generation one containing cryolite (15% of the active ingredient) was the most effective. The use of sprays containing insecticides only is preferable to mixtures of fungicides and insecticides; moreover, aluminium arsenate and cryolite must not be mixed with copper-containing spray fluids. The best time to apply the sprays is when the flower buds begin to separate. Against the larvae of the summer brood the time of application is determined by the flight curve of the moths or after egg-laying has been observed. This treatment can be made as the first caterpillars appear or 4 or 5 days after the maximum flight of the moths.

1413. Peyer, E. 634.8-2.78
Die Bekämpfung des Heu- und Sauerwurmes. **(Vine moth, *Cochylis ambiguella*, control.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 240-3.

In this recapitulation of the fundamentals of vine moth control the importance of timing the treatment accurately is emphasized. While spraying with DDT or Nirosan against the first generation may be carried out in combination with copper sprays against mildew, a special treatment of the grapes is necessary for satisfactory control of the second generation.

1414. Simon, L. 634.13-2.793
L'hoplocampe du poirier en Anjou en 1943. (*Hoplocampa brevis* Klug.). **(The pear sawfly in Anjou in 1943.)**
Ann. Épiphyt., 1944, **10**: 79-83, bibl. 4.

Good results against pear sawfly were obtained with arsenical sprays applied at the beginning of blossoming and at the time of full bloom. The applications which are most effective, being made at the time of full bloom, are liable to cause mortality among bees. The exact dates for treatment ought to be determined by the stage of development of the trees but more particularly by the stage reached by the sawflies. Caging will give useful information about their flight and also about their egg-laying, stages that are not exactly in conformity with the stage of growth in the pear. It was noticed that the flight of the insects was of very short duration in 1943.

1415. Chaboussou, F., and Lavaur, J. 634.22-2.793
La lutte contre l'hoplocampe des prunes [*Hoplocampa flava* L.] en Agenais. **(Control of plum sawfly in Agen.)**
C.R. Acad. Agric. Fr., 1945, **31**: 60-4.

The life history of the plum sawfly is outlined and spraying trials for its control are described. The best results were obtained with (1) a mixture containing rotenone 3·75 g. plus sulphonated terpene alcohol 425 g. per hectolitre, and (2) a liquid containing hexachlorocyclohexane (666) 240 g. per hectolitre. With each of these the crop from the treated trees was more than five times that from control trees.

16. Nikolskaia, M. N. 634.2-2.793
Evolution of *Eurytoma* species (*Hymenoptera, Chalcididae*) in connexion with the geographical distribution of their food-plants of the sub-fam. *Prunoideae*.
C.R. Acad. Sci. U.R.S.S., 1945, **48**: 609-11, bibl. 19.

ree closely related species of the chalcid genus *Eurytoma*
., with a somewhat similar life history, feed on stones of
unoideae. The females oviposit into immature fruits
d the larvae feed on the kernels. The infested fruit
ually drops when still unripe with the larva hibernating
it; pupation takes place in spring and the adult appears
nen the ovaries are present on the trees. The three
ecies, *E. maslovskii* Nik., *E. samsonovi* Vas., and *E.*
ygdali End., are described and their geographical distribu-
n in relation to that of their host plants is discussed.

17. Bardia i Bardia, R. 632.76: 634.1/8
L'*Oryzaephilus surinamensis* Linné (Col. Cucujidae), observat sobre fruits secs, fruites dessecades, cereals i altres productes vegetals. (*Oryzaephilus surinamensis* L. on dry fruits, dried fruits, cereals, etc.) [Summary in Spanish and English.]
Arxius Inst. Cienc., Barcelona, 1937, 3: 501-20, bibl. 92. [Received May, 1946.]

far as cereals are concerned the damage caused by this
sect is regarded as of secondary importance, but it may
use great damage to dried and dry fruits. Its life history
described, and control measures are the combined
plication of vacuum and fumigants.

18. Meadly, G. R. W. 632.954
Dinoc—a selective weed-killer.
J. Agric. W. Aust., 1945, **22**: 361-6.

inoc is an orange dye made from by-products of the
stillation of coal. The commercial preparation is a
nse suspension of fine crystals forming a paste consisting
30% sodium dinitro-orthocresylate and 70% water. The
y product is inflammable. Broad-leaved annual weeds
onion crops can be controlled with dinoc, which should
applied when the weed seedlings are very small, at which
ge a 1: 120 solution plus 2 lb. of sulphate of ammonia
r 100 gal. at 100 gal. per acre is very effective and causes
gligible damage to onions which have reached the two-leaf
ge. The use of Dinoc for killing weeds in flax in Western
ustralia is only advisable in the case of heavy infestations
broad-leaved weeds which are likely to reduce very
iously the yield and quality of the flax.

19. Guillaumin, A. 634.8-2.5
Le poireau de vignes. **(The vine leek.)**
C.R. Acad. Agric. Fr., 1944, **30**: 513-4.

e vine leek, *Allium polyanthum*, grows as a weed in large
antities in the vineyards round Cognac. In 1940 it was
ld as a leek at 10 francs per bunch. It resembles a small
k, with a cylindrical stem as thick as one's finger and
aching a height of 10 cm. Its odour is rather like that of
e leek but not so strong.

20. Seely, C. I. 632.954: 577.15.04
A preliminary report on the possible use of 2,4-dichlorophenoxyacetic acid for the control of wild morning glory in orchards.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 21-4.

sts were made on morning glory, in 1945, of 2,4 D
aterials in apple orchards. Good top kills were obtained
t the effect on the roots was erratic and regrowth from
killed roots occurred on all the plots. More than one
plication is required to eradicate this weed. Where the
ray did not come in contact with the trees, injury was
t apparent.

1421. Bevengut, —. 632.951 + 632.952
Sur l'emploi rationnel des produits colloïdaux anticryptogamiques et insecticides. **(The rational application of colloidal fungicides and insecticides.)**
C.R. Acad. Agric. Fr., 1945, **31**: 277-80.

The "pintagram" technique is a method of atomizing very finely divided fungicides and insecticides in the form of colloids, emulsions or solutions. It is claimed that by means of this technique a reduction can be effected in the products used, and an economy of cost and labour. Details of the machine are not given.

1422. Yadoff, O. 632.95: 631.588.1
Poudrage électrique des végétaux et procédé Yadoff. **(Electrical dusting of plants.)**
C.R. Acad. Agric. Fr., 1946, **32**: 173-5.

The disadvantages of spraying and dusting in disease control are mentioned, and an improved method of applying dusts is described. The dust particles are projected through a tube in which supersonic speeds are generated so that the particles are not only rendered more minute but are electrified by friction with the air. The electrified particles are attracted towards the plant surfaces and become distributed uniformly over the plant in a very thin homogeneous layer. The method is apparently in an experimental stage and no details as to the construction of the apparatus are given.

1423. Branas, J. 634.8-2.9
Le lutte contre les parasites en 1946. **(Pest and disease control in 1946.)**
Prog. agric. vitic., 1946, **125**: 254-8.

The writer envisages a return to pre-war measures for the control of diseases and pests, now that certain chemicals are becoming more available, particularly copper sulphate. It will now be possible to return gradually to the old formula for bordeaux mixture (2% copper sulphate) for use against downy mildew [*Plasmopara viticola*]. Various forms of sulphur for use against oidium [*Uncinula necator*] are mentioned, and there are notes on the control of black rot of grapes [*Gloeosporium ampelophagum*], brenner [*Pseudopeziza tracheiphila*], codling moth, and the vine moths. A reference is made to the possible use of some of the new insecticides.

1424. English, H., and Gerhardt, F. 632.4: 634.23
The effect of ultraviolet radiation on the viability of fungus spores.
Phytopathology, 1946, **36**: 100-11, bibl. 19.

The development of fungus decay in sweet cherries during transportation and marketing is one of the most serious problems in the sweet cherry industry. The effect of ultraviolet radiation (wavelength 2,537 A.U.) on the spores of 7 fungi that cause decay of sweet cherries and on the development of the rot was determined. The fungi showed great variation in the susceptibility of their spores to the radiation; spores with dark coloured walls showed greater resistance than those with light coloured walls. The viable spore-load on the fruit conveyor in a commercial sweet cherry packing shed was reduced by exposure to ultraviolet light, but the number of living air-borne spores in an irradiated section of the packing room did not differ significantly from the number found in a portion of the room not irradiated. Natural decay of sweet cherries was not controlled by ultraviolet radiation, even though the period of exposure was extended up to 24 times that employed commercially. As used in these studies, ultraviolet light appears to offer no promise for the control of decay, whereas the maintenance of proper storage and transit temperatures definitely reduces losses from decay.

1425. Raucourt, M. 634.8-2.952
Vue d'ensemble sur les essais anticryptogamiques de 1942. **(A general view of the fungicide trials of 1942.)**
Ann. Épiphyt., 1943, **9**: 163-7.

Inorganic copper compounds appear to be fungicidal in

proportion to the Cu ions liberated. It is unlikely that important discoveries (fungicidally) will be made with the inorganic copper salts; moreover the salts of other metals are less active or more troublesome to use. The investigation of organic compounds is indicated and further research should be directed towards the discovery of active organic substances for the control of mildew and of oidium of the grape vine, not losing sight of the possibility of finding formulae that would be efficacious against both.

1426. Bock, E. 632.952
Une technique nouvelle de préparation de bouillies de traitements antiparasitaires. **(A new method of preparing fungicides.)**
Progr. agric. vitic., 1946, **125**: 303-8.
Describes with figures three methods of preparing bordeaux mixture. The apparatus occupies much less space than that formerly used.

1427. Moore, M. H. 634.11-2.952
Improving the field performance of standard protective fungicides. I. The place of spreaders in the spray programme for apple trees.
J. Pomol., 1946, **22**: 76-91, bibl. 24.
The spreaders used in the experiments described were sulphonated lorol, lethalate standard wetting preparation, Agral N, ester salts, sodium B sulphonates, sulphite lye, and gelatin. It was found that a spreader was unnecessary with lime-sulphur and nicotine for scab and sawfly control, given accurate timing of applications and adequate volume and pressure of spray. Weak bordeaux mixture (2-3-100) proved unsafe and so is not recommended for apples, especially dessert varieties; the inclusion of a spreader increased spray damage. Colloidal sulphur was improved by a spreader, especially when applied at low pressure with nicotine for sawfly, but soap should be avoided on account of possible spray damage. There was but little difference in the effectiveness of the various spreaders tested, though a few of them caused damage and are therefore undesirable.

1428. Lewis, F. H., and Thurston, H. W., Jr. 634.11-2.952
Studies on old and new fungicides for apple disease control.
Proc. Pa St. hort. Ass. 87th annu. Meet. 1946, being *Pa St. hort. Ass. News*, 1946, **23**: 72-83.
Notes are given of old and certain new fungicides. Among the new ones are the following:—*Compound 341* (active ingredient 2-heptadecyl glyoxaldine). This shows promise against cherry leaf spot and apple scab. It seems to have a very long residual effect. *Isothan Q15* (lauryl isoquinolinium bromide), unsuccessful under Pennsylvania conditions. *Puratized* (phenyl mercuri triethanol ammonium lactate) shows promise but cannot be used after petal fall: technique not yet understood. *Dithane* (disodium ethylene bisdithiocarbamate) unsatisfactory. *Zorlate* (zinc dimethyl dithiocarbamate) effective against *Alternaria* rot of cherries. *Compound 604* (dichloronaphthoquinone) shows much promise but is liable to cause injury to both apples and cherries.

1429. Brian, P. W., and McGowan, J. C. 632.4: 632.96
Viridin: a highly fungistatic substance produced by *Trichoderma viride*.
Nature, 1945, **156**: 144-5, bibl. 2.
Viridin-producing strains of the fungus *Trichoderma viride* were found to be characterized by the production of a bright yellow colour in the culture medium. From the latter viridin was isolated, a substance which is so highly fungistatic that aqueous solutions at pH 3·5 prevent the germination of *Botrytis allii* conidia at concentrations of the order of 0·005 μgm./ml. *Fusarium* spp. are among other fungi showing a similar degree of sensitivity to viridin.—Jealott's Hill Research Station, Bracknell, Berks.

1430. Groves, A. B. 632.952: 634.11 +634.23
Promising new fungicides on apples and cherries.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 123-6.
Problems are discussed and notes given on some of the new organic chemical fungicides which are still under trial.

1431. McDonald, J. E., and Fraps, G. S. 632.951 +632.952
Commercial insecticides and fungicides in Texas 1944-1945.
Circ. Tex. agric. Exp. Stat. **108**, 1945, pp. 15.
This is the third annual report dealing with the law governing the sale of commercial agricultural insecticides and fungicides in the State of Texas.

1432. O'Neill, W. J. 632.6/7: 632.95
Progress report of pest control.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 27-32.
The author collates the results of his own observations and those of a number of other entomologists in N. America on trials with DDT. It has been conclusively shown that the use of DDT, while selective in its toxicity, is not selective in the most beneficial manner. Its use for codling moth control has shown that mites may develop to the point where the crop is a total loss. Experiments in which DDT was combined with one of the dinitro compounds gave excellent control of both codling moth and Pacific mite with only slight injury to foliage. The use of DDT alone or in combination with a dinitro compound resulted in the development of serious woolly aphid infestation, for its parasites and predators were destroyed by the spray. DDT is known to be highly toxic to many beneficial insects particularly the parasitic hymenoptera.

1433. Le Goupils, P. 519: 632.951
Les méthodes statistiques dans l'expérimentation. **(Statistical methods in experiments.)**
Ann. Épiphyt., 1942, **8**: 189-210.
With special reference to the application of statistical methods in determining the dosage of insecticides.

1434. Lepesme, P., and Marie, A. 632.944
Un appareil simple pour l'étude entomotoxicologique des gaz. **(A simple apparatus for studying the entomotoxicology of gases.)**
Ann. Épiphyt., 1942, **8**: 211-7, bibl. 29.
The apparatus is described and illustrated. Its chief advantages are its simplicity, easy manipulation, ease of mounting, dismounting and cleaning the various parts, and particularly the fact that it requires only materials usually used in a laboratory. Mercury is not used, so that there is no danger of mercury vapour affecting results. Both qualitative and quantitative studies can be carried out.

1435. Fransen, J. J., Terpstra, P., and Westenberg, L. 632.951
Draagstofproblemen. **(Carrier problems.)**
Tijdschr. PlZiekt., 1946, Jg. **52**, pp. 37-65.
This paper deals with the use of "carrier" substances used with insecticidal dusts. The experiments described are on forestry pests but the general conclusions are of wider application. The experimental work was carried out with the primary object of finding a carrier cheaper than the hitherto employed talcum, and involved (A) biological investigations with dusts containing rotenone, pyrethrum and sodium fluosilicate, (B) physical investigations on the structure of dust mixtures and of their adhesive properties. As a carrier ground dolomitic marl was found to have good qualities, and it satisfied the practical demands.

1436. Hough, W. S. 632.951: 634.11
DDT experiments in Virginia.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 178-85.
Results are given of 1 year's tests. In combination lime sulphur and summer oil emulsions reduced the effectiveness

of DDT more than other spray ingredients used. Yet even so such combinations were all more efficient in killing codling moth larvae than lead arsenate in similar tests. The DDT was used at a strength of 1 lb. per 100 gallons, the lead arsenate at 3 lb. DDT at 1½ lb. per 100 gallons promised excellent control of Comstock's mealybug. On all trees subjected to several applications of DDT, mite populations developed sufficiently to cause bronzing of apple foliage.

1437. SHAW, H. 632.951
The new insecticides D.D.T. and benzine hexachloride [=gammexane] and their significance in agriculture.
Reprinted from *J. roy. agric. Soc. Engl.*, 1945, **106**: 204-20, bibl. 66.
The article is a very readable summary of our present knowledge on the two new sensational materials. In view of the scarcity of published papers on benzine hexachloride (666), by far the larger portion of the results discussed and of the literature cited refers to DDT. "Much work", the author concludes, "still remains to be done with both DDT and benzine hexachloride, especially in the directions of devising the most suitable formulations for particular purposes, of determining minimum concentrations for effective control, and of observing their cumulative effect upon the general fauna of treated areas." The first few years of the commercial use of these insecticides, it is urged, should be regarded as an extension of the experimental phase.

1438. STAMMERS, F. M. G., AND WHITFIELD, F. G. S. 632.951
Toxicity of D.D.T. to man.
Nature, 1946, **157**: 658.
Fifteen men of a spraying team were employed continually from 5 to 9 months in routine spraying with DDT in Royal Naval establishments in Colombo. Although, owing to the heat, little in the way of protective clothing was worn and the men were exposed to spray dripping from ceilings and leaking apparatus, clinical investigations and the general demeanour of the men indicated that no ill-effects whatsoever had been incurred.—R.N. School of Tropical Hygiene, Colombo.

1439. NEWCOMER, E. J. 634.2/7-2.951
Some possible uses for DDT on soft fruits.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 51-3.
DDT has proved effective on: the oriental fruit moth, *Grapholitha molesta* (Busck.); peach twig borer, *Anarsia lineatella* Zell., on apricots; tarnished plant bug, *Lygus oblineatus* (Say.); cutworms attacking hops; and leafhopper on grapes. Results on the cherry fruit fly, *Rhagoletis cingulata* (Loew), and on aphids are conflicting. Experiments are envisaged or in progress for tests against the green peach aphid, *Myzus persicae* (Sulz.); San José scale, *Aspidiotus perniciosus* Comst.; and the shot-hole borer, *Scolytus rugulosus* (Ratz.). A dust containing 3 to 5% DDT is quite effective against some species of ants and apparently does not harm vegetation.

1440. LEEFMANS, S. 632.951/952: 631.544
De toepassing van aerosols in kassen en in het veld; tegen insecten, maar ook tegen fungi! **(The use of aerosols in greenhouses to control insects and even fungi.)**
Meded. Direct. Tuinb., 1946, pp. 323-6.
A review of recent investigations with aerosols in the U.S.A. Under glass DDT has been used in aerosols with success against thrips, white fly, and the aphid *Myzus persicae*.

1441. LEEFMANS, S. 632.951
Nieuws betreddende andere insecticiden dan DDT in de U.S.A. **(Insecticides other than DDT in U.S.A.)**
Meded. Direct. Tuinb., 1946, pp. 409-11, 475-80.
This is a review of insecticides, other than DDT, in use in U.S.A. It includes notes, first on old products still in use, e.g. lead arsenate, calcium arsenate, barium and sodium fluosilicates, nicotine sulphate, tannate and bentonite, helleboris, pyrethrum and derris, and then on the newer preparations, e.g. gammexane, sabadilla, derivative of terpenes and pine oil, phenothiazine and phthalonitrite, lethane, xanthone and synergists.

1442. ROSELLA, E. 632.951: 638.14
Des insecticides nouveaux apparaissent sur le marché. Menacent-ils l'apiculture? **(Are the new insecticides a danger to bees?)**
Progr. agric. vitic., 1946, **125**: 407-9.
The author considers that the danger of arsenical poisoning of bees in sprayed orchards is slight, and poisoning from DDT and 666 unproved. There is a risk, however, of bees being poisoned after visiting colza sprayed with DDT or 666 against the pollen beetle *Meligethes* [*aeneus*].

1443. RAUCOURT, M., AND VIEL, G. 632.951
Propriétés insecticides de l'hexachlorocyclohexane. **(The insecticidal properties of hexachlorocyclohexane.)**
C.R. Acad. Agric. Fr., 1945, **31**: 558-65.
The insecticidal action of hexachlorocyclohexane [666] against the potato beetle was tested in comparison with that of DDT. The results show that general toxicity is the same for both products, DDT being more rapid in action. The insects cease feeding on the first day after treatment. Fumigation with the two products gave very different results, however, DDT being practically inactive, while HCH is a violent respiratory poison.

1444. ROSS, W. A. 632.951
A potent new insecticide—Benzene hexachloride or 666.
Processed Publ. Dep. Agric. Canada Div. Ent. **50**, 1946, pp. 3.
This memorandum is intended to inform entomologists briefly of the chemical and physical properties of gamma benzene hexachloride (666). In experiments all 666 formulations should be based on the actual gamma isomer content, 0·5 lb. per 100 gallons being probably the maximum rate for practical use in sprays. In laboratory tests a concentration range of 1 lb. to 0·0312 lb. per 100 gallons could be used.

1445. LOUVEAUX, J. 638.14: 632.95
L'influence des traitements arsénicaux des arbres fruitiers sur les abeilles butineuses en Bretagne. **(The effect of arsenic treatments of fruit trees on hive bees in Brittany.)**
C.R. Acad. Agric. Fr., 1944, **30**: 525-6.
The writer carried out a trial on apple trees in flower at Rennes, Brittany, with a spray containing sulphate of copper 1 kg., lime 2 kg., arsenate of lead (20% As) 1 kg., water 100 l. Bees visited the flowers shortly before and after the treatment but there was no evidence that they were adversely affected, for no dead bees were to be found either under the trees or on the approaches to the hives.

1446. COUTURIER, A., AND MÉMERY, R. 638.14: 632.95
Du danger pour les abeilles des traitements arsenicaux dirigés contre les arbres fruitiers en fleurs dans le Bordelais. **(Arsenical sprays a danger to bees in the Bordeaux region.)**
C.R. Acad. Agric. Fr., 1945, **31**: 58-60.
The authors record serious mortality among bees in Bordeaux from poisoning, following their visits to apple trees that had

received spray containing arsenate of lead. These results appear to be contrary to those obtained by Louveaux [see above]. The discrepancies are attributed to the habits of the bees in the two places. At Rennes only some of the worker bees extracted nectar and no pollen. At Bordeaux almost all the working bees visited flowers covered with the spray (1% As) and collected both nectar and pollen. The pollen had become toxic and was doubtless the cause of the high mortality.

1447. CHAPPELLIER, A., AND RAUCOURT, M. 632.951: 634.1/7
Les traitements insecticides des prés-vergers. Action de l'arsenic sur les vaches laitières. **(The use of insecticides in grass orchards. The action of arsenic on milch cows.)**
Ann. Épiphyt., 1941, 7: 119-28.

This toxicological study was carried out on a cow that was dosed with known amounts of arsenic salts. The results are described in some detail, and the conclusion drawn is that the quantities of poison that cows may absorb in an orchard recently treated are, in general, incapable of causing serious harm.

1448. HANSBERRY, R., AND CLAUSEN, R. T. 632.951
Insecticidal properties of miscellaneous plants.
J. econ. Ent., 1945, **38**: 305-7, bibl. 3.

Dusts from large numbers of leguminous and miscellaneous plant species of different origin were tested for their insecticidal effect on the Mexican bean beetle and some other insects. No new sources of insecticides of outstanding action were discovered.—Cornell University.

1449. KREÏER, G. K. 632.951: 615.779.1
Pyrethrum as an insecticidal plant, and its cultivation in the U.S.S.R. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 95-106.

None of the species of pyrethrum so far tried in the U.S.S.R. has been found to contain so much pyrethrin as *P. cinerariaefolium*, but on account of its abundant foliage, which can be utilized as well as the flowers, its ability to yield an aftermath, and its adaptability to more northerly climates, *P. macrophylla* is considered worth further trial. Among various extracting fluids, dichlorethane was found to extract from the inflorescences the largest proportion of pyrethrin with the least admixture of impurities. Autumn-sowing trials are briefly described, and various items of information are given on density of plant distribution, harvesting and drying. As regards breeding, the author explains how, by crossing spring and autumn varieties of *Pyrethrum*, it may be possible to produce an autumn variety which will develop numerous shoots until late in the season, yielding its crop of flowers in the autumn. There is evidence that small inflorescences contain the largest amounts of pyrethrin, most of which is situated in the ovaries of the peripheral florets.

1450. DROUINEAU, G., GUEDON, A., AND VIEL, G. 632.944: 634.1/7
Contribution à l'étude de la concentration en acide cyanhydrique de l'atmosphère au cours des fumigations sous bâches. **(The concentration of hydrocyanic acid in the atmosphere during fumigations in gas chambers.)**
Ann. Épiphyt., 1943, **9**: 47-60, bibl. 7.

The use of hydrocyanic acid for the decontamination of fruit trees has become important in France because of the invasion of the San José scale. Irregularities in the results obtained suggested the trials described. The fumigation chambers, constructed so as to be placed over the trees, were octagonal to allow of easy calculation of volume. The method of producing the gas and the calculation of its concentration in the chambers are described, and the results are recorded by graphs, tables, and two folding sheets. Within a few minutes the distribution of the gas is roughly uniform in the upper half of the chamber, while in the lower half the concentration is lower. It is important, in determining the lethal doses, not to consider the concentration at the central point, but the curve of minimum concentration in the space occupied by the branches. For each dose of the gas it is necessary to determine experimentally the curve of concentrations.

1451. VIEL, G. 632.944: 634.1/7
Sur la rétention de l'acide cyanhydrique par les fruits soumis à la désinfection (première partie). **(The retention of hydrocyanic acid by fumigated fruits (part 1).)**
Ann. Épiphyt., 1943, **9**: 61-6.

Peaches and pears left in an atmosphere of HCN absorb hydrocyanic acid in quantities which depend on the nature of the fruit and the concentration of the gas. The acid is not only retained on the surface of the fruit but also penetrates into the interior. It evaporates slowly when the fruits are aerated at atmospheric pressure and there remains about a quarter of the amount initially fixed.

1452. BELTRAN, E., AND BOUAS, R. 632.952.2
a Activité des bouillies cupriques. **(The activity of different copper sprays [including bordeaux, burgundy mixtures and a number of proprietary substances].)**
Ann. Inst. agric. Algér., 1942, **1**: 2: 82-99, bibl. 8.

b BLAUVELT, W. E. 632.654.2
The internal morphology of the common red spider mite (*Tetranychus telarius* Linn.).
Mem. Cornell agric. Exp. Stat. **270**, 1945, pp. 35, bibl. 47.

c BRIAN, P. W., AND OTHERS. 632.952
Gladiolic acid: an antifungal and antibacterial metabolic product of *Penicillium gladioli* McCull and Thom.
Nature, 1946, **157**: 697-8, bibl. 3.

d CLEVELAND, C. R. 632.78: 632.951
The situation of codling moth control.
Proc. 60th Conv. Amer. pomol. Soc., Dec. 1944, pp. 152-64.

e DESALBRES, J. 634.8-2.2.5
Observations sur la flore des vignes dans la région de la Mitidja de Maison-Carrée. **(Weed flora in the vineyards of the Mitidja de Maison-Carrée.)**
Ann. Inst. agric. Algér., 1945, **2**: 1: 101-18.

f FANKUCHEN, I., SCHNEIDER, M., AND SINGER, J. 632.951
Some X-ray crystallographic data on DDT.
Science, 1946, **103**: 25.

g FRÉZAL, P. 632.78
Notes sur le cycle évolutif de *Laspeyresia pomonella* L. dans la region de Tlemcen en 1938. **(Notes on the life cycle of the codling moth in Algeria made in 1938.)**
Ann. Inst. agric. Algér., 1939, **1**: 1: 151-79, bibl. 24.

h DE TEMPE, J. 633.88
Alkaloïdvorming door *Claviceps purpurea* (Fr.) Tul. in saprophytische cultuur. **(Alkaloid formation by the ergot fungus in saprophytic culture.)** [English summary 3 pp.]
Thesis, Univ. Amsterdam, 1945, 84 pp., bibl. 81. Published by Phytopath. Lab. Willie Commelin Scholten, Baarn.

VEGETABLE, RUBBER AND OTHER PLANTS.

1453. EKBRANT, L. 635.1/7(48.5)
Köksväxtodlingens utveckling i Sverige. **(The development of vegetable growing in Sweden.)** *Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok 1942*, Stockholm, 1943, pp. 71-81.
The change in popular diet, which made vegetables a necessity for all, instead of being a luxury for the well-to-do, provided a powerful stimulus for the development of vegetable growing in Sweden. By producing improved varieties adapted to Swedish conditions the Horticultural Research Station at Alnarp helped the industry to supply increased quantities of better vegetables. The adoption of modern methods of cultivation and marketing further aided the vegetable grower.

1454. NILSSON, F. 635.1/7(48.5)
Köksväxtodlingens planläggning 1942. **(Planning vegetable production for 1942.)** *Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942*, Stockholm, 1943, pp. 227-31.
The statistical material assembled concerning the area devoted in Sweden to different horticultural crops is of more than passing interest.

1455. NILSSON, F., AND TOMETORP, G. 635.1/7(48.5)
Sort- och stamförsök med köksväxter år 1943. **(Vegetable variety trials at Alnarp in 1943.)** *Meddel. Trädgårdsförs.* **23,** 1944, pp. 22, bibl. 7.
The report of the Swedish State vegetable trials for 1943 may claim a wider interest than most of its predecessors, as it includes several items of a more general character. (1) A short history is given of the trials, which were set up at Alnarp in 1914 on a small scale and have since become an important factor in Swedish horticulture. (2) The regulations governing the variety trials were issued in November 1941. They are printed here in full, later additions being collected in an appendix. With cross-pollinated kinds the tests extend to *strains* of a variety, while with self-pollinating vegetables only varieties are recognized. (3) The working of the Swedish vegetable seed certification scheme is elaborated. The tests for trueness to variety or strain do not confine themselves to morphological characters but comprise yield too. Finally, the results of the 1943 trials are reported.

1456. NILSSON, F., AND ANDERSSON, F. 635.1/7(48.5)
Sortförsök med köksväxter vid Tosemarkens Försöksstation under åren 1942-1944. **(Vegetable variety trials at Tosemarken Experiment Station, 1942-44.)** [English summary 1½ pp.] Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1945, pp. 289-314, as *Meddel. Trädgårdsförs.* **30.**
The Tosemarken Experiment Station was established in 1941 as one of the smaller branches of the Swedish Horticultural Research Station at Alnarp, in co-operation with the County Agricultural Society of Gothenburg and Bohus. Of the total area, which is limited to 5 hectares, about ½ hectare has been devoted to vegetable trials. During the first three-year period, 1942-44, varieties of the following vegetables were tested: Kidney and wax beans, cauliflower, cabbage, carrot, leek, garden beet, lettuce and medium-tall peas. The results are reported in detail.

1457. LAMM, R., TOMETORP, G., AND VOSS, Å. 635.1/7(48.5)
Sort- och stamförsök med köksväxter år 1945. **(Vegetable strain and variety trials [at Alnarp] in 1945.)** [English summary 1½ pp.] Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1945, pp. 315-33, bibl. 10, as *Meddel. Trädgårdsförs.* **31.**
The report presents the latest results of the official Swedish vegetable variety trials at Alnarp, the rules of which are explained. Only Swedish-bred varieties or strains are given the award "First class Elite". The next award, "First-class Strain" is valid only for 6 years, but it may be renewed if further trials have shown that the strain has remained true and that it still belongs to the best of its kind. Some new first-class varieties and strains of tomato, cucumber and carrot are listed.

1458. LAMPRECHT, H. 635.1/7: 631.531(48.5)
Sveriges försörjning med köksväxtfröer. **(Vegetable seed production in Sweden.)** *Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942*, Stockholm, 1943, pp. 133-41.
Swedish vegetable seed production and the possibility of making the country self-supporting are discussed. With the exception of spinach, it is concluded, Swedish growers cannot compete with growers of warmer countries as regards price, and protective tariffs are advocated. Such a policy would give a chance to Swedish-bred varieties, which are better suited to local conditions, and thus the whole country would benefit. Certain vegetables, the seed of which cannot be grown successfully in Sweden, would have to be exempted, for instance onions, radish, late lettuce varieties, beans and cucumbers.

1459. BATEMAN, A. J. 635.1/7: 631.531
Genetical aspects of seed-growing. *Nature*, 1946, **157**: 752-5, bibl. 17.
Varietal standards often show a downward trend from the original quality and yield as a result of either mechanical or genetical contamination of the seed. The article, an adaptation of part of a thesis, is devoted to the latter trouble, the former being a matter of care in harvesting and threshing. The tolerance limit to genetical contamination depends on the use for which the seed is intended. A lower degree of purity is required for so-called commercial seed, i.e. seed for raising crops, than for stock seed, from which the seedsman produces the commercial seed of later seasons. Contamination is most serious in élite seed, which serves to continue a highly selected line in a few plants, from which stock seed is obtained. Broadly, there are two kinds of genetical contamination, namely cryptic and obvious. In élite seed the former is most undesirable, while the latter can be easily remedied by roguing. In the case of stock seed and commercial seed the reverse is true: cryptic contamination is relatively harmless, while the elimination of obvious contamination presents practical difficulties. It is of great importance to determine experimentally the minimum isolation requirements of individual seed crops according to the purpose for which they are grown. Minimum distances will depend chiefly on the degree of compatibility—self-incompatible crops such as *Brassica* species, radish, beet, carrot, parsnip, being, of course, the least safe—and on pollen concentration or the proportion of contaminant pollen to non-contaminant kinds. Preliminary trials carried out at the John Innes Horticultural Institution with turnip, radish, beet and maize, have shown that at distances of more than 200 ft. increase in distance produced no visible reduction in contamination and that for plots of moderate size the first 50 ft. will reduce contamination to 1%, whereas the next 50 ft. will produce scarcely any additional effect. It was also found that increasing the plot size beyond a certain area is ineffective. In radish this size corresponds to a strip 12 rows wide at 1 ft. spacing. A table indicates the recommended distances for some 18 crops, only some of them based on experimental results. The figures show that the seed grower seems to be inclined to err on the safe side.

1460. MCLAUGHLIN, J. H. 635.1/7: 631.531.17
Vegetable seed treatment for Oklahoma. *Bull. Okla agric. Exp. Stat.* **B-293,** 1946, pp. 24.
The results of seed disinfection trials with 21 vegetables are

presented, recording the effect of various chemicals on stand and, in many cases, on disease incidence and yield. The treatment proved especially successful on spinach, beet, pea, lettuce, carrot, salsify, sweet corn, cucumber, cantaloupe and water melon, when conditions were unfavourable for rapid seedling development. Recommendations as to rate of application are made for each vegetable. Arasan and Spergon have consistently produced the best seedling stands.

1461. HIBBARD, A. D. 635.1/7
Production of vegetable plants.
Circ. Mo. agric. Exp. Stat. **308,** 1946, pp. 16.
Growers are advised to raise their own plants for early vegetable production. The types of frames and hotbeds described and illustrated include the flue-heated hotbed, which is extensively used by growers of sweet potato and late tomato plants. While the methods discussed apply to raising vegetable plants in general, special chapters are devoted to the growing of tomato plants in cold frames and to the growing of sweet potato plants.

1462. EBBINGE WUBBEN, G. J. H. 631.544: 631.2
Commisserie ter bestudeering van de constructie van kassen en bakken. **(A commission for studying the construction of greenhouses and frames.)**
Meded. Direct. Tuinb., 1946, pp. 412-7.
The personnel is announced of a commission appointed to study methods, and draw up plans for improving the construction of greenhouses and propagating frames. The conditions to be aimed at are discussed with reference to temperature, air-conditioning, light, soil-treatment and shading. A " loss-meter " is described and illustrated. The instrument consists of 11 glass plates of known light-transmissibility. By adjustment and comparison with a sample of glass the transmissibility of the sample can be determined and its value for use in the construction of greenhouses can be assessed.

1463. POST, J. J. 519: 635.1/7
Blanco proeven 1944. **(Blank trials.)**
Meded. Direct. Tuinb., 1946, pp. 243-7.
The author states that it is desirable before a trial is started to obtain preliminary yield records on the ground to be occupied by the trial, with a view to estimating the variability of the material in that particular piece of soil. On the basis of the preliminary yield records information can be obtained of the variability within a certain crop or within a particular treatment (manuring, varieties, etc.). Trials are described and the results shown graphically using endive, leeks, shallots, lettuce and beans.

1464. CHRISTIANSEN, J. E. 631.67
Irrigation by sprinkling.
Bull. Calif. agric. Exp. Stat. **670,** 1942, pp. 124.
This bulletin, which has only recently come into our hands, contains information likely to be of use to anyone installing or using ordinary sprinkler irrigation. It would not appear to contain anything new to experts on irrigation in this country.

1465. VIRTANEN, A. I., AND LAINE, T. 581.175.11: 633.3
Red, brown and green pigments in leguminous root nodules.
Nature, 1946, **157**: 25-6, bibl. 6.
In addition to the red pigment, haemoglobin, the authors have always found in leguminous root nodules a brown pigment, viz. methaemoglobin with trivalent iron. The root nodules of vigorously growing legumes are red on bright days, the amount of haemoglobin being high in comparison with that of methaemoglobin. During cloudy days the brown colour deepens in the nodules. If soybeans and peas are kept in darkness, the colour of the nodules changes to brown and later to green. A similar change of nodule colour takes place under natural conditions after the end of flowering. The transformation of haemoglobin into the green pigment denotes the cessation of nitrogen fixation. The nitrogen-fixing capacity of root nodules can thus be estimated from the nodule colour. The activity is high if the colour is red, it is lower if the colour is brown and it is nil if the colour is green. In the latter case nitrogen fixation is irrevocably at an end. The chemistry of the transformation of pigments is discussed. The names leghaemoglobin and legmethaemoglobin are suggested for the pigments of root nodules.—Biochemical Institute, Helsinki.

1466. MARKHAM, R., AND SMITH, K. M. 632.8
A new crystalline plant virus.
Nature, 1946, **157**: 300.
A virus disease of cruciferous plants, which appears to be one not previously recorded, is described. The main symptoms are a bright yellow and green mottling. The virus was extracted and crystallized.

1467. JAKUŠEVSKIĬ, E. S. 633.17
The prospects of cultivating *Sorghum* in the arid regions of the U.S.S.R. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 178-80.
The sorghum millets have many uses, and can be grown in regions of the U.S.S.R. where the rainfall does not exceed 150 mm. annually. The grain is a source of alcohol, starch, and dyes. The stems provide rum and cellulose, as well as alcohol and starch, and they can be plaited into various useful articles. Brooms and brushes are made from the inflorescences.

1468. RAZUMOV, V. I. 631.541.11/12: 633.491
The development of plants grown from tubers, produced as a result of grafting. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 21-30.
The experiments described show that when various *Solanum* spp., and a *Datura* sp. are grafted on varieties of the cultivated potato, on *Solanum antipovoczii* and other potato spp., not only the tubers of the first generation but also those and the seeds of the second generation bear evidence of genetical modification and of an influence of the scion upon the stock greatly exceeding that generally supposed.

1469. LIMASSET, P., AND GODARD, M. 633.491-2.411
Nouvelles recherches sur le *Phytophthora infestans* (Mont.) de Bary. **(New research on potato blight.)**
Ann. Épiphyt., 1940, **6**: 145-56, bibl. 21.
The outbreak of an epidemic of potato blight depends on (1) the susceptibility of the variety grown, (2) the development of foliage (microclimate), (3) the number of primary foci, and (4) the general climatic conditions (temperature and atmospheric humidity). These four factors are interdependent, that is, the value of any one, necessary for infection, depends on the value of the three others. Thus a large number of primary foci of infection in a potato plot may allow of an epidemic outbreak under general climatic conditions insufficient to produce the same result when the foci of infection are fewer. Again, plants that are close together may be severely attacked under climatic conditions insufficient to cause attack on plants farther apart.

1470. RAUCOURT, M. 633.491-2.76
La détermination des doses toxiques de certains produits envers le doryphore. **(The determination of toxic doses of certain products against the potato beetle.)**
Ann. Épiphyt., 1941, **7**: 129-33.
The method of determining median lethal doses (D.L.M described is applicable to stomach poisons used against the Colorado beetle. It gives particularly precise results wit

products that have no contact or repellant action, such as the insoluble arsenical salts. In addition to its practical role, which allows a determination in advance by a simple laboratory test as to whether a new product has insecticidal action, the method is of scientific interest; the figure for the D.L.M. that it provides for a certain insect is a constant for the active substance considered. For example, for commercial lead arsenate and the larva of the potato beetle the D.L.M. is 19γ per gram of insects ($\gamma = \frac{1}{1{,}000}$ mg.).

1471. CHAPPELLIER, A., AND RAUCOURT, M. 633.491-2.76
Les rapports entre les traitements arsenicaux antidoryphoriques et le gibier. **(The connexion between arsenic control measures against the potato beetle and game.)**
Ann. Épiphyt., 1942, **8**: 1-45.
The authors collate information obtained from many sources with regard to the suspected deleterious effect on, and death of, game (particularly pheasants and partridges) as a result of the use of arsenical sprays and powders against the potato beetle. They conclude that such treatments only very exceptionally cause mortality among game.

1472. RAUCOURT, M., AND OTHERS. 633.491-2.76
L'action insecticide des arséniates de chaux contre le doryphore. **(The insecticidal action of arsenate of lime against the potato beetle.)**
Ann. Épiphyt., 1943, **9**: 1-9.
Ortho-, meta-, and pyroarsenates of calcium were compared with lead arsenate for their effect on the potato beetle [*Leptinotarsa decemlineata*]. The action of the ortho- and the pyroarsenates was about the same. Meta-arsenates of calcium and lead arsenate were less effective. Commercial arsenates of lime were found to be more active than lead arsenate. It is concluded that the arsenates of lime can effectively replace lead arsenate in the control of the potato beetle.

1473. GRISON, P., AND CHEVALIER, M. 632.76
Les sorties hivernales de doryphores adultes. **(The winter emergence from the soil of the Colorado beetle.)**
C.R. Acad. Agric. Fr., 1945, **31**: 216-8.
The appearance of the Colorado beetle (*Leptinotarsa decemlineata*) above ground in winter is possible after the end of the diapause, that is, about the middle of winter; a few warm sunny days are sufficient to bring out of hibernation a few active individuals, but for some time they are few and localized. They become destructive only if they can find forced potatoes or tomatoes near their points of emergence.

1474. BOCZKOWSKA, M. 632.76: 633.491
Remarques sur l'écologie du doryphore à Saint-Genis-Laval (Rhone) en 1943. **(Notes on the ecology of the Colorado beetle at Saint Genis-Laval in 1943.)**
C.R. Acad. Agric. Fr., 1945, **31**: 218-20.
Spring weather was earlier in 1943 than in 1942 and contamination of the potato crop by the Colorado beetle started at the beginning of May. In 1943, as in 1942, the beetle developed through two generations, owing to the favourable weather conditions. Its rate of multiplication was very great during 1943, and the potato fields were ravaged in summer and in autumn.

1475. BOCZKOWSKA, M. 633.491-2.76
Réactions du doryphore vis-à-vis variétés courantes de la pomme de terre à Avignon en 1941. **(The reaction of the Colorado beetle towards commonly grown varieties of potato at Avignon in 1941.)**
C.R. Acad. Agric. Fr., 1945, **31**: 220-2.
Of the three common varieties of potato grown round Avignon, viz. Bintje, Eerstelingen, and Institut de Beauvais, the Colorado beetle showed a preference for the last mentioned.

1476. CAMBLAT, L. 633.5(611)
Les plantes textiles en Tunisie. **(Fibre plants in Tunisia.)**
Tunis. agric., 1942, **42**: 243-59, bibl. 23.
The author notes that the following textile plants are native to Tunisia:—diss (*Ampelodesmos tenax*), passerine (*Thymelaea hirsuta* L.), dwarf palm (*Chamaerops humilis*) and esparto grass (*Stipa tenacissima*). He then discusses the commercial cultivation of the following:—ramie, flax, hemp and cotton, with much the greatest emphasis on cotton. Sisal is dealt with in another article [see next abstract].

1477. TROUILLET, —. 633.526.23
Culture et industrie de l'agave sisal. **(Production and processing of sisal.)**
Tunis. agric., 1941, **42**: 263-9.
In the face of increasing difficulty in getting fibre supplies from overseas in 1941, the Tunisian agriculturist was urged to grow sisal. Although it had not hitherto been grown on a large scale in French North Africa there appeared to be good grounds for supposing that it would grow very well. Hints are given on cultivation, these being based on methods adopted elsewhere. The processes of extracting fibre, alcohol and cellulose are briefly considered.

1478. NOVIKOFF, V. 633.71
Essais d'amélioration de la combustibilité des tabacs tunisiens. **(How to improve burning quality in Tunisian tobaccos.)**
Ann. Serv. bot. Tunis., 1941, **18**: 213-54, bibl. 32.
A review of the literature is followed by an account of three years' trials by the Botanical Service of Tunisia. The conclusion is reached that under Tunisian conditions the burning qualities of tobacco can be improved by the judicious use of fertilizing elements, particularly of nitrate of potassium, or of sulphate or carbonate of potassium provided enough nitrogen is given by other means. The use of the chloride salts is bad for combustibility and is undesirable. The effects of other fertilizers are also discussed.

1479. ROVESTI, G. 633.81
La *Salvia sclarea* L. **(Clary cultivation.)**
Ital. agric., 1946, **83**: 105-9.
A note on the properties and cultivation of an essential oil plant. Clary fits well into a rotation and will yield profitably for 3 years, the oil being derived from the inflorescences. It is very easily grown and is not particular as to soil. One weeding when the plants are very young suffices. For sowing, about 2¾ lb. of seed are used per acre.

1480. NIEDERHAUSER, J. S. 633.822: 632.452
The rust of greenhouse-grown spearmint, and its control.
Mem. Cornell agric. Exp. Stat. **263**, 1945, pp. 30, bibl. 25.
In seasons of severe infection by the rust *Puccinia menthae*, glasshouse plantings of spearmint, *Mentha spicata*, are almost a complete failure in the north-eastern United States. The ætiology of the fungus is described at length and control measures are discussed under the heads: exclusion, eradication, protection, immunization. The first method is the simplest and offers at the same time the greatest promise. The rhizomes to be planted for winter forcing are washed with a hose and then immersed for 10 minutes in water heated to 115° F. In the course of the treatment the water temperature should not be allowed to sink below 111-112° F., which is still within the temperature range lethal to the fungus spores. After draining and dipping in cold water the rhizomes may either be planted immediately or kept for some time. The treatment proved completely successful in trials on a commercial scale.

1481. Mostovoj, K. 633.842: 581.162.3
Konstitučni sterilita u papriky jednoleté (*Capsicum annuum* L.). **(Constitutional sterility in paprika.)** [German summary ¾ p.]
Reprinted from *Sbornik české Acad. Zeměd.*, 1941, **16**: 308-16, bibl. 54.

Although the tendency to flower abscission and fruit drop in paprika is a genetical character, the extent of the loss experienced seems to be partly determined by environmental factors. Observations in Moravia showed that the trouble is aggravated by cold and wet weather, especially in not well drained soils. Too generous nitrogen applications and high temperatures were found to favour malformation of fruits. Pollen grains from defective flowers are sometimes capable of fertilization. The early roguing of plants showing constitutional sterility is therefore necessary. In paprika growing for seed, the necessity for isolation is stressed. The bibliography is largely of articles in English.

1482. Mohammad, A., and Ahmad, S. 633.85
A note on the essential oil of mustard in *Brassica* species and *Eruca sativa*.
Ind. J. agric. Sci., 1945, **15**: 181-3.

The greater pungency in rai (*Brassica juncea*) and taramira (*Eruca sativa*) crops appears to be due to the presence of higher amounts of essential oil in the developing seeds as compared with those of toria (*Brassica napus* L. var. *dichotoma*) and brown sarson (*B. campestris* var. *sarson*).

1483. Alam, Z. 633.85
Nomenclature of oleiferous brassicas cultivated in the Punjab.
Ind. J. agric. Sci., 1945, **15**: 173-81.

The oleiferous brassicas cultivated in the Punjab are locally divided into three main groups known as rai=mustard, sarson=colza, and toria=rape. There are several characteristics peculiar to each group but they can be distinguished on the basis of leaf characters. Tables are given showing the characters of yellow-seeded sarson, brown-seeded sarson and toria, and the species to which they have been referred.

1484. Arnaud, G., and Darpoux, H. 633.85-2.4
Les maladies des plantes oléagineuses. **(The diseases of oil-producing plants.)**
C.R. Acad. Agric. Fr., 1945, **31**: 64-5.

The scarcity of imported vegetable oils in France during the war stimulated the cultivation of plants formerly grown for their oil, and the erection of local refineries. The chief diseases of such oil-producing plants are briefly described, for rape (*Brassica napus*), turnip (*B. rapus*), gold of pleasure (*Camellina sativa*), opium poppy (*Papaver somniferum*), sunflower (*Helianthus annuus*), safflower (*Carthamus tinctorius*), and *Lallemantia iberica*. Field control measures are considered to be uneconomic, though bordeaux mixture is effective against the disease of the opium poppy caused by *Helminthosporium papaveri*. Seed dressing is recommended.

1485. Guillaume, —. 633.85-2.76
Comment lutter contre les insectes parasites du colza: altises et méligèthes. **(The control of the flea beetles and pollen beetles of colza.)**
C.R. Acad. Agric. Fr., 1945, **31**: 465-6.

In 1945 great damage was caused to colza (*Brassica napus*) in central France by flea beetles and pollen beetles. The flea beetle lays its eggs in the young plants in autumn and on the older plants in spring. The larvae penetrate the colza stems and cause the plants to wilt and when fully grown they enter the ground to pupate, the adult insects appearing from June to August. The pollen beetle is smaller than the flea beetle; it appears at flowering time and devours the ovaries. For control the author prefers dusting to spraying because of the shortage of water in dry seasons. He obtained excellent control of both flea beetle and pollen beetle with Gesarol (5% DDT in talc). Advice given to growers is:—(1) Sow in rows to facilitate treatment. (2) As soon as the flea beetle appears apply Gesarol powder at the rate of 5 kg. per hectare, the application to be made in the early morning when there is no wind and dew is on the plants. (3) A second treatment should be applied just before the flowers open, to the leaves to destroy the spring flea beetles, and to the unopened flowers against the pollen beetles.

1486. Chowdhury, S. 633.853.74-2.48
Control of *Cercospora* blight of til.
Ind. J. agric. Sci., 1945, **15**: 140-2, bibl. 10.

Cercospora blight of til (*Sesamum orientale*) caused by *C. sesami* reduces the crop 4·5 to 12% (average 5%). It is perpetuated through infected seeds and plant debris and is disseminated by wind. Chemical treatment has been found ineffective for control, but hot water treatment (immersing the seed for 30 minutes in water at 128° F.) has given very satisfactory results on a field scale.

1487. Godard, —. 633.859
La maturation de l'oeillette et la radiation solaire. **(The ripening of the opium poppy and solar radiation.)**
C.R. Acad. Agric. Fr., 1945, **31**: 47-9.

Experiments were carried out to determine the influence of solar radiation on capsule production and on lipogenesis in the opium poppy. Plants exposed to sunlight were compared with others shaded by screens. The results showed that the summer intensity of solar radiation, by its influence on growth, induced the development of a large number of flowers per plant. A reduction in intensity by 50% caused a considerable diminution in the weight of capsules, seeds and oil as a result of the retardation of flowering and a reduction in the number of capsules per plant.

1488. Nečaeva, N. T. 633.88
Contribution to the biology of *Salsola gemmascens* Pall. [Russian.]
J. Bot. U.R.S.S., 1945, **30**: 6: 269-72.

Salsola gemmascens grows in the Solončak deserts of Turkmenia. The various stages of growth are described. The foliage contains 3·40% of citric acid, and 6·08% of oxalic acid in the dry matter.

1489. Madueño Box, M. 633.88
Contribuciones al estudio de plantas medicinales productoras de glucósidos. **(Medicinal plants producing glucosides.)**
Bol. Inst. nac. Invest. agron., Madrid, 1945, No. 13, pp. 69-93, bibl. 50.

From the results of experiments started in 1941 the author gives advice on methods for growing the foxglove, *Digitalis purpurea*, as a source of drugs. Ammonium sulphate appears to be the most efficient fertilizer both for quantity of leaves and for pharmaceutical quality. The latter is stated to have been determined by Dr. Fernandes de Sotc by his painless method (on cats).

1490. Irani, R. J. 633.88
Chemistry of kurchi seeds. Part I. Isolation of a crystalline glyco-alkaloid.
Curr. Sci., 1946, **15**: 106.

The bark and seeds of kurchi (*Holarrhena antidysenterica*) are drugs of Hindu Materia Medica. Extracts from the seeds yielded a light brown crystalline glyco-alkaloid, the properties of which are described.

1491. Carmin, J., Joffe, J., and Blumenfeld, K. 582.73: 581.192
On sea-algae.
Bull. indep. Biol. Lab. Kefar-Malal, 1946, Vol. 4, No. 2, p. 1, being abstract from *Hassadeh*, Vol. 20, No. 7.

Possibilities of exploiting the seaweeds of the Palestinian

shore are envisaged. An analysis of the chemical composition of *Enteromorpha* is presented.

1492. COUCH, J. F., NAGHSKI, J., AND KREWSON, C. F. 633.12: 633.88
Buckwheat as a source of rutin.
Science, 1946, **103**: 197-8, bibl. 4.

The investigation was prompted by the discovery of the importance of the flavonol glucoside, rutin, as a drug, of which buckwheat is a convenient source. The tabulated data show that the weight of rutin per plant reaches a maximum in 37 to 51 days from emergence, an acre of buckwheat yielding about 50·25 lb. in 40 days. Storage of the crop presents some difficulty, as the rutin content decreases during drying, especially if the drying process is slow. No loss of rutin appears to occur after the buckwheat has been thoroughly dried.—Eastern Regional Research Laboratory, Philadelphia.

1493. JANG, C. S., AND OTHERS. 633.88.51
Ch'ang Shan, a Chinese antimalarial herb.
Science, 1946, **103**: 59.

Isolation of the active principle in *Dichroa febrifuga* roots.—National Institute of Health, Chungking.

1494. ALABOUVETTE, L., AND RAUTOU, S. 633.854.78
Sélection et production de semences de tournesol. **(The selection and the seed production of sunflowers.)**
C.R. Acad. Agric. Fr., 1945, **31**: 142-6.

Work carried out at the agricultural research station at Montpellier since 1943 is described. The object was to select types of sunflower suitable for cultivation in that region, and to organize the rapid production of seed of good quality. The results obtained for the various varieties under trial are tabulated.

1495. PROKOFIEV, A. A. 633.913
Grafting as a method of study of the synthesis of caoutchouc in plants. [Russian.]
Isvest. Acad. Sci. U.S.S.R., Biol. Ser., 1945, No. 5, pp. 583-97, bibl. 10.

A perfect union between the scion and the rootstock was obtained after grafting the root cuttings of 2-3 months old *Taraxacum vulgare*, *T. kok saghyz* and *T. krym saghyz*. The three plants were used both as scions and rootstocks. The plants resulting from such grafts developed, flowered and fruited normally. A method of tapping used as an aid to anatomical examination indicated that complete contact is established between the latex systems of scion and rootstock after grafting. By noting the variation in the shape of latex globules of various dandelion species, it was possible to ascertain that no interchange of latex between the scion and rootstock and vice-versa occurs in the first year of the life of grafts. During the second year there was some movement of latex, from the scion to the rootstock, due probably to intensive transpiration. Further observations on different graft combinations showed that the caoutchouc-containing component inhibited the growth of the caoutchouc-less one. But the rubberless component stimulated the growth of the rubber-containing components. The roots of rubber-bearing rootstocks obtaining their assimilates from the dandelion scions accumulated the same amounts of rubber as the grafts in which the scion and the rootstock were of the same species. And conversely, the rubber content in the roots of dandelion rootstocks remained low even with kok saghyz and krym saghyz scions. Rubber still accumulated in the roots of kok saghyz and krym saghyz rootstocks grafted with *Lappa major* scions. These results indicate that in such plants as kok saghyz and krym saghyz caoutchouc is apparently synthesized in the latex vessels of the root and not in the leaves. It is suggested that in further investigations to ascertain the physiological role of latex vessels the grafting method may be used for transferring the latex of one component into the latex vessels of another.

1496. MEDVEDEV, P. F. 633.913
Results of introducing American species of *Apocynum*. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 107-16.

Among the species from North America were *Apocynum cannabinum*, *A. hypericifolium*, and *A. androsaemifolium*, and from the Asiatic regions of the U.S.S.R. were *A. venetum* and *A. sibiricum*. They were grown both near Leningrad and in the territory of Krasnodar. The main botanical characteristics of the American species are described. The rates of growth, development, and other observations of practical value are compared with those of the Asiatic species. *A. hypericifolium* was the earliest; the Asiatic species were all later than the American. The tallest sp. was *A. cannabinum*; *A. hypericifolium* was a little shorter but less branched. The American spp. were hardier, more drought resistant, and more adaptable to different soils than were the Asiatic. They were also more leafy (an important consideration with regard to the yield of rubber), and yielded larger quantities of raw material; but, so far as the incomplete study of the technological properties of all the *Apocynum* spp. allows of conclusions, the Asiatic species possess the better textile characteristics. The *Apocynum* spp. yield not only fibre from the stems, as well as rubber and resins from the leaves (in which as much as 6% and 9% respectively may be present in the dry matter), but the rhizomes may be of medicinal value, and are plentifully produced by *A. hypericifolium*.

1497. MEDVEDEV, P. F. 633.913: 581.192
The rubber content of North American species of *Apocynum*, and some factors which affect rubber accumulation. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 101-8.

The American *A. cannabinum* and *A. hypericifolium*, and the Middle Eastern *A. venetum*, were grown near Leningrad and also in the region of Krasnodar. It was found that the hot day conditions of the south enabled the plants of all the species to accumulate far more rubber than did northern conditions. The rubber content increased from about 1% at the end of the first season to about 6% in the second and following seasons. The American species, however, yielded a rubber which included the higher proportion of resins, but was produced in larger amount because the plants were more leafy than those of the Asiatic sp., and had larger leaves. The American species are better fibre plants. Being quicker to mature, they yield their products sooner. Most of the rubber is formed in the parenchyma of the leaves, where it is related to the photosynthetic process. Only a little rubber is formed in the latex vessels of the leaves, stems and roots. Vegetative propagation, if carried out in the same geographical region, will not affect the rubber content.

1498. PROKOFIEV, A. A. 633.913: 581.192
On the synthesis of rubber in plants. Filling of latex vessels with foreign latex.
C.R. Acad. Sci. U.R.S.S., 1945, **48**: 520-3.

This is a continuation of the author's previous studies (see *H.A.*, 15: 1138, 1139). The latex of rubber-producing plants contains "globules" which may be spherical, rod-shaped or dolioform according to the species of plant developing the latex, and this has been employed in a study of the transportation, in grafted plants, of the latex from the root (of the rootstock plant) to the above ground parts of the scion. By combining plants which differ sharply in their latex no mixing of the latexes could be detected during the first year, but further study, during the second year, showed that transport of the latex from the stock into the organs of the scion is possible.

1499. Grebinskiĭ, S. O. 633.913: 581.192
Oxidation and the accumulation of rubber in rubber-bearing root crops. [Russian.]
Biohimija (*Biochemistry*), 1945, **10**: 379-84.
The activities of oxidase, peroxidase and catalase, the content of vitamin C and the rate of respiration in the leaves and roots of kok saghyz, tau saghyz, and krym saghyz were studied in order that the relationship between oxidation and rubber accumulation could be determined. It is concluded that these two processes are inversely proportional, and that krym saghyz, with a rubber content of 2 to 4%, has the highest rate of oxidation, tau saghyz with a rubber content of up to 30% the lowest rate, and kok saghyz, with a rubber content of 8 to 10%, an intermediate rate of oxidation. A test is described which enabled the rates of oxidation in individual roots to be compared, and to serve as a guide to plant breeders in selecting their material. The author disagrees with the opinion that the increase of rubber accumulation, as the roots age, is associated with the increase of carbohydrates which accompanies it; it is the degree of oxidation which determines how much rubber will be accumulated.

1500. Mynbaev, K. 633.913
The conditions of growth, and increasing the productiveness of kok saghyz. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 87-100.
Kok saghyz is still a wild plant, even under cultivation. The chief characteristics desirable in the cultivated crop are that they should be ready for harvesting in one year instead of two, that the duration of the period when the flowers are emerging be curtailed, that dormancy be eliminated, growth in the early stages hastened, and variability of the leaf margins reduced. Optimum conditions are essential and correct spacing, to a consideration of which this article is largely devoted, is all important. The conclusion is reached that it has been grown too densely in the past and that spacing requisite for maximum rubber yield would be 200-300,000 plants per hectare.

1501. Purvis, E. R., and Hanna, W. J. 635.1/7: 632.19: 546.27
Truck crop investigations. Vegetable crops affected by boron deficiency in Eastern Virginia.
Bull. Va Truck Exp. Stat. **105**, 1940, pp. 1721-42, bibl. 22.
At least 16 vegetable crops in Eastern Virginia were found to exhibit boron deficiency symptoms under field conditions. Borax tolerance studies showed that in the case of all vegetables grown in Eastern Virginia 10 lb. of borax may safely be added to each ton of fertilizer mixture applied.

1502. Heim de Balsac, H., and Leroux, D. 635.2
Le tubercule alimentaire d' " Oca-oxalide du Pérou ". **(The nutritive tubers of the Peru Oka.)**
C.R. Acad. Agric. Fr., 1945, **31**: 373-4.
The cultivation of the Peru Oka (*Oxalis crenata* Jacq.) in France is advocated because of its edible tubers. These offer a variation from the vegetables commonly grown, although from a nutritive point of view their proteid and glucide content is lower than that of the potato and Jerusalem artichoke.

1503. Belval, H. 635.24: 581.192
Emploi du réfractomètre dans l'industrie du topinambour. **(The use of the refractometer in the Jerusalem artichoke industry.)**
C.R. Acad. Agric. Fr., 1945, **31**: 120-1.
The polarimetric method of estimating sugars is not applicable to the Jerusalem artichoke because of its complex glucidic composition which varies with the age of the tubers and with varieties. The refractometer can, however, be used with success but some precautions must be taken because of the heterogenicity of the tubers, which are richer in glucides in the peripheral parts than in the centre.

1504. de Vilmorin, R. 635.24
Échantillonnage et analyses de topinambours. **(Sampling and analysis of Jerusalem artichokes.)**
C.R. Acad. Agric. Fr., 1946, **32**: 122-6.
Strains of Jerusalem artichoke were analysed with reference to their yield of levulose and alcohol. The results were examined statistically.

1505. Calzecchi-Onesti, A. 635.25(45)
La coltura della cipolla. **(Onion growing [in Italy].)**
Ital. agric., 1946, **83**: 45-59.
The whole story of cultivation for bulbs and for seed is given. The climate of the north of Italy is more suitable than that of the south. Varietal notes are given and difficulties of storage are discussed.

1506. Trofimec, N. H. 635.25: 581.162.3
The biology of the flowering and pollination of onions. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 76-86.
Mainly the following species are discussed: *Allium cepa*, *A. fistulosum* and *A. porrum*. Varieties which are hardy and healthy must be bred by crossing these and other species. Hence the object of this article is to present all the knowledge about the flowering of each species which is relevant to pollination and fertility, and to the practical needs of breeding and seed production. The development of the florets takes place in five stages, in the last of which all the pollen has been shed and the stigma is ripe for fertilization. The technique of castration and isolation is briefly explained. The inflorescences are pollinated almost always by bees. A little self-pollination occurs, more or less according as the interval between the ripening of the pollen and that of the stigmata is short or long, but inbreeding is not recommended. It was found possible to cross *A. cepa* with *A. fistulosum* and with *A. porrum*.

1507. Trofimec, N. 635.25
The " topping " of onions. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 186.
Of the 300 to 600 florets in each inflorescence, all but 50 to 100 were removed during the early stages of flowering. Those remaining were left to ripen. The average weight of 1,000 seeds was found to be 137% greater than that of 1,000 seeds from untreated plants. Thirteen varieties of onion were thus compared, and topping proved to be beneficial to all of them.

1508. Brierley, P., and Stuart, N. W. 635.25: 632.8
Influence of nitrogen on susceptibility of onions to yellow-dwarf virus.
Phytopathology, 1946, **36**: 297-301.
Four varieties of onion grown at high (60 p.p.m.) and low (6 p.p.m.) initial N levels were inoculated with onion-yellow-dwarf virus. Both the percentage expression of symptoms and the percentage actual infection were lower at the lower N level.

1509. Brierley, P., and Smith, F. F. 635.25: 632.8
Reaction of onion varieties to yellow-dwarf virus and to three similar viruses isolated from shallot, garlic, and narcissus.
Phytopathology, 1946, **36**: 292-6.
A number of varieties of onion showed different reactions to the four viruses. Two green-bunching types proved to be immune to all four viruses. These viruses are all transmissible by *Myzus persicae*.

1510. Ramsey, G. B., Heiberg, B. C., and Wiant, J. S. 635.25: 632.4
Diplodia rot of onions.
Phytopathology, 1946, **36**: 245-51.
A moderately serious market disease of Texas-grown white-skin Crystal Wax onions caused by *Diplodia natalensis* is described for the first time. Coloured-skin varieties of onions from Texas were not affected. Only the dead outer scales and the dying parts of the outer fleshy scales of white onions are invaded. No decay of living fleshy scales of bulbs has been observed and all attempts at inoculation of such tissues have failed. The disease may cause a great reduction in market value by producing slight decay and by blemishing the southern white onion crop.

1511. Jones, H. A., and others. 635.25: 632.4
Relation of color-inhibiting factor to smudge resistance in onion.
J. agric. Res., 1946, **72**: 259-64, bibl. 15.
Coloured onion bulbs are more resistant to smudge (*Colletotrichum circinans*) than white ones and this study was undertaken to determine the effect of different colour genotypes upon resistance. The conclusions drawn are: The most important factor in resistance to the disease is the pigment in the outer scales of the bulbs. White bulbs homozygous for the dominant colour inhibitor *I* are highly susceptible to the disease. Coloured bulbs with the genetic constitution *ii* are highly resistant. Cream bulbs with the constitution *Ii* are approximately intermediate in resistance between the pure white and the coloured ones.

1512. Maan, W. J. 635.25: 632.77 + 632.78
Biologie en phaenologie van de uienvlieg, *Chortophila antiqua* (Meigen) en de preimot, *Acrolepia assectella* (Zeller), als grondslag voor de bestrijding. **(The biology and phenology of the onion fly and the leek moth as a basis of control.)** [Summary in Dutch, English, French and German.]
Meded. TuinbVoorlichtDienst, No. **39**, 1945, 92 pp., bibl. 90.
In Holland considerable damage is caused to onions, shallots and leeks by the onion fly, *Chortophila antiqua* (Meigen) and by the leek moth, *Acrolepia assectella*. The onion fly attacks chiefly onions on the islands of Zuid-Holland and Zeeland near Rijnsburg, and leeks in the Kennemerland and around Venlo. The leek moth is important in the last two areas. In spring and early summer the fly mostly damages beds of young leek; in midsummer and late summer the most important damage is done to leeks planted out. The morphology and life history of the two insects are described. The natural enemies of the onion fly are the ichneumon fly *Aphaerata cephalotes* Hal. and the fungus *Tarichium* [*Empusa*] *hylemyiae* Lacon., and of the leek moth, the ichneumon fly *Microgaster globata* L.

1513. Barrons, K. C. 635.31: 631.55
The field snapping method of harvesting asparagus.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **28**: 111-4.
The cost of harvesting asparagus is considerably lowered by snapping the spear in the field instead of cutting it at or below ground level. Tests showed that if a growing asparagus spear is held just below the tip and bent over, the break will come at about the point where it would have been snapped at the cannery. In addition, labour is saved in processing, which should reduce the price of the canned product to the consumer. Two years' trials showed that the snapping method of harvesting has no detrimental effect on yield and indicate that it may be beneficial.

1514. Cohen, S. I. 635.31: 632.48
A wilt and root rot of *Asparagus officinalis* L. var. *altilis* L.
Abstract in *Phytopathology*, 1946, **36**: 397.
Fusarium oxysporum f. *asparagi* causes a foot rot and vascular wilt in asparagus in the United States which is distinct from a foot rot in Germany caused by *F. culmorum*. No effective control measure is known, and fertilizers have no significant effect upon the disease.

1515. Vasiljev, V. L. 635.34/35: 631.521
Selecting varieties of cabbage and cauliflower for the far Far North. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 67-76.
Experiments were carried out at several places near the Arctic Circle in order to find the varieties most suitable for cultivation where the season is short; and to demonstrate the superiority of cabbages and cauliflower grown from seed which has been produced locally to those grown from seed produced in more southerly latitudes. Among the cabbage varieties, Number One (Nomer Pervyi) was the earliest and usually gave the largest yields. Valjvatjevskaja and Slava also yielded plentifully at some of the stations. Snowball (Sneznyi Sar) proved to be the best of the cauliflowers. Erfurt was tried only for one year, but its yields at one of the stations encourage further experiments.

1516. Nyhlén, Å. 631.84: 635.34 + 635.35
Inverkan av spridningstiden för salpeter på avkastningen hos blomkål och vitkål. **(The effect of time of nitrate applications on cauliflower and cabbage yields.)** [English summary 1½ pp.]
Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1943, pp. 16, bibl. 17, being *Meddel. Trädgårdsförs.* **24.**
Sodium nitrate was applied to a medium-late cauliflower variety and a late cabbage variety at the rate of 800 kg. per hectare, the total dose being given in 2 or 3 applications at planting, 4 weeks later and again 4 weeks later still. The treatments did not show any significant difference in yield, but the results suggest that, especially in the case of cauliflower, the 8-week limit after planting should not be exceeded. The trials were carried out at Rånna.

1517. McMillan, T. J., and Todhunter, E. N. 635.34: 577.16
Dehydroascorbic acid in cabbage.
Science, 1946, **103**: 196-7, bibl. 3.
Ascorbic acid losses in cabbage on standing after cutting were partly accounted for as dehydroascorbic acid. Data are presented.—University of Alabama.

1518. Foster, R. E., and Walker, J. C. 635.34-2.8: 577.16
Improvement of ascorbic acid content in yellows-resistant cabbage.
Abstract in *Phytopathology*, 1946, **36**: 398.
From the results of crossing resistant varieties with varieties of a high ascorbic acid content it was concluded that by using the individuals selected, there may be developed lines of several commercial varieties giving a greatly increased ascorbic acid content as well as homozygous type A resistance to yellows.

1519. Hylmö, B. 635.34: 581.192
Disackaridbildning hos vitkål vid kall väderlek. **(Disaccharide formation in cabbage in cold weather.)** [German summary 5½ pp.]
Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1942, pp. 37, bibl. 35, being *Meddel. Trädgårdsförs.* **17.**
Mature cabbage heads of 6 varieties grown in different localities in Sweden were chemically analysed, with special reference to the disaccharide: total sugar ratio. A relation was shown to exist between the temperature prevailing during the last developmental stages and the accumulation of disaccharides in the mature cabbage head, in that cold weather was conducive to an increase in the disaccharide: total sugar ratio. The ratio is therefore higher in late than in early varieties and particularly high in heads grown in

the northern regions. It is argued that the adjustment in the equilibrium of mono- and disaccharides in favour of the latter under the influence of low temperature is brought about by polymerization of monosaccharides. Possibly, the disaccharide: total sugar ratio may be used as an indicator in the selection of cold-resistant cabbage strains with good keeping qualities.

1520. Felton, M. W., and Walker, J. C. 635.34: 632.4
Environal factors affecting downy mildew of cabbage.
J. agric. Res., 1946, **72**: 69-81, bibl. 22.
The severity of downy mildew of young cabbage seedlings (*Peronospora parasitica*) is greatest in areas in the United States where the plants grow in seedbeds throughout protracted cool periods, during which relative humidity is high. Results indicate that little benefit can be expected in the control of mildew through adjustment of fertilization of seedbeds. Eradication of cruciferous weeds to control the disease is of no value, since the race of the mildew on cabbage only infects members of *Brassica oleracea* and no wild form of this species occurs in the United States.

1521. Harper, H. J., and Cross, F. B. 635.41: 631.84
Effect of ammonium nitrate as a fertilizer for spinach.
Bull. Okla agric. Exp. Stat. **B-288**, 1945, pp. 15.
Spinach seedlings were found to be very susceptible to injury by top dressings of ammonium nitrate. However, when the plants had reached the 5-6 permanent leaf stage, the benefit derived from an application of the fertilizer at the rate of 200 lb. per acre largely outweighed the damage on nitrogen-deficient soils. Coarse particles of crystalline ammonium nitrate (fineness: 20 mesh) appeared to cause less injury than 100 mesh material.

1522. Parris, G. K. 635.615: 632.651.3
Use of D-D mixture permits two crops of watermelons per year in breeding program.
Abstract in *Phytopathology*, 1946, **36**: 408.
Applying D-D mixture to Norfolk sand known to contain *Heterodera marioni* and suspected of containing the meadow nematode, immediately following a spring crop of melons, permitted growth to maturity of a second crop of melons.

1523. Carmin, J. 582.73: 581.192
Growing summer cucumbers in southern Palestine.
Bull. indep. biol. Lab. Kefar-Malal, 1946, Vol. 4, No. 2, pp. 4-5, being abstract from *Hassadeh*, Vol. **26**, No. 6.
In 1942 the fruiting period of summer cucumber in 3 localities in southern Palestine lasted 33, 36 and 60 days respectively. At Kefar-Menachem, which holds the record, the temperature was higher and the difference between both maximum and minimum temperature and relative humidity was smaller than at the two other places. Differences in soil sulphur content at the three localities may have been a contributory factor.

1524. Erikson, E. 635.64 + 635.63
Gurk- och tomatodling. Jämförelser mellan holländska och svenska odlingsmetoder. **(Cucumber and tomato growing. A comparison of Dutch and Swedish methods.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok 1942, Stockholm, 1943, pp. 88-91.
Cucumbers: The Dutch pay a more meticulous attention to the preparation of their compost, which is an advantage, but the renewal of the top spit of soil in their glasshouses every autumn is considered superfluous. However, the regular removal of the Schiedamer cow manure—a kind of liquid manure*—has proved beneficial. The Dutch method of growing cucumbers is described. *Tomatoes*: As with cucumber, the seed is sown in pure river sand. In contrast to Holland, the seedlings are, as a rule, pricked out once only. The planting distance in Dutch tomato-houses is wider than is customary in Sweden. Other special features of Dutch practice are discussed.

* The manure is derived from specially-fed cattle.

1525. LeBeau, F. J. 635.63: 632.4
Control of cucumber anthracnose with Fermate.
Abstract in *Phytopathology*, 1946, **36**: 404.
Outstanding results were obtained with 10% Fermate dust.

1526. Corbett, W. 635.64
Experiments on the production of tomatoes in the open.
J. Pomol., 1946, **22**: 1-10.
This is a detailed account of experiments carried out over 4 years (1941-4) at the Glasshouse Demonstration Station, Wilmington, Kent, with duplicate trials at the East Malling Research Station in 1943-4. Progress reports of the work have already appeared (see *H.A.*, 14: 1758 and 15: 1799). The varieties Earliest of All, Market King, Harbinger and Early Market proved to be very suitable for growing in the open. Earliest of All and Harbinger gave earlier crops, X-Ray and Ailsa Craig later crops, than most of the varieties tried. Increasing the number of plants per acre gave an increased yield, but this was not proportionate to the increase in plant population except when the plants were grown in double rows. The double row system cannot be generally recommended, because of the difficulties of spraying and dusting for blight control. The addition of farmyard manure gave an increased yield of fruit picked ripe, and picked green at the end of the season. Evidence was obtained that added nitrogen is beneficial when dung is present, but that added potash is of little value. The use of formaldehyde for partial soil sterilization of land to be used for outdoor tomatoes did not produce any significant differences in the two years of the experiment. Plants raised in pots produced an earlier crop and a higher total yield than plants raised in trays.

1527. Culpepper, C. W., Caldwell, J. S., and Hutchins, M. C. 664.84.64: 635.64
A comparison of some tomato varieties for preserve making.
Fruit Prod. J., 1946, **25**: 263-7, 302-5, 309, 314.
Preserves of acceptable to excellent quality can be made from tomatoes of the large-fruited canning type, and the products from such varieties compare very favourably in colour, texture, flavour, and general desirability with those made by an identical process from the small-fruited types grown chiefly for making preserves or pastes. The principal differences between the products made from the large-fruited and the small-fruited varieties are the considerably greater disintegration of tissues during boiling and the lower consistency or viscosity of the preserve at a given solids content, which are characteristics of the products of the large-fruited types. Because of the very low solids content of the tomato and of the destruction of its pectin in processing, it is necessary to use much larger percentages of fruit in the mixing than is the case with other fruits in order to obtain desirable consistency in the preserve.

1528. Chouard, P., Guédron, P., and Mariscal, R. 635.64
Essais préliminaires sur la normalisation des variétes de tomates en rapport avec leurs divers usages. **(Attempts to standardize tomatoes according to the use to which they are to be put.)**
C.R. Acad. Agric. Fr., 1945, **31**: 81-6.
The tomato has many uses but the varieties that are best for one purpose are not necessarily most suitable for others. The qualities sought in tomatoes are discussed under the headings: earliness, constancy of cropping, yield, size and shape of fruit, the dried extract, sugar content, vitamin C content, proportion of seeds, and proportion of skin. The

varieties that are outstanding in relation to any one of these characters are listed under that character.

529. ŠIVRINA, A. N. 635.64: 577.16
The inheritance of chemical characters in tomatoes. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 133-41.
The following tomato varieties and their hybrids were studied: Ailsa Craig, Earliana, Kostolato, Up-to-Date, Bison, Red River, March Beauty, Best of All, Zikaracii, New Fifty-day, and diploids and tetraploids of Dutch Export and Smorodinovidnyž. The content of vitamin C, sugars, organic acids (citric, malic, tartaric and others), carotin, xanthophyll, lycopin, flavin, both in the fruit of the parent plants and of the F_1 hybrids, were compared. It was observed that some of the substances named were to be found in larger amounts in the hybrids than in either parent.

530. BERGER, G. 635.64: 632.3
Une bactériose de la tomate nouvellement observée au Maroc (*Phytomonas michiganensis* [E. F. Smith] Bergey et al.) **(Bacterial canker of tomato in Morocco.)**
Ann. Épiphyt., 1942, **8**: 178-87.
Bacterial canker of tomato was first seen in Morocco in 1937 but it has not become serious in that country and it is negligible compared with other tomato diseases. Precautionary measures should be taken against it, however. In particular seed should be taken only from plants known to be free from the disease. Affected plants should be immediately burnt.

1531. YOUNG, P. A. 635.64: 632.411
Late blight of tomatoes in East Texas at transplanting time.
Phytopathology, 1946, **36**: 389-91.
Observations indicate that *Phytophthora infestans* may be transmitted from one region to another through movement of infected tomato plants, and under favourable weather conditions an epiphytotic may occur in the newly infested area.

1532. HICKMAN, C. J. 635.64: 632.4
Infection of outdoor tomato crops by *Didymella lycopersici*.
J. Pomol., 1946, **22**: 69-75, bibl. 6.
Field observations suggested that infection originated in the propagating soil; experiments were planned to examine this possibility of seed-borne infection. The conclusion drawn is that infection contracted during propagation—from soil contaminated by spores liberated from seed-borne *pycnidia* or from plant debris—is of greater importance in relation to outbreaks of stem and fruit rot than infection originating from field soil, and demonstrates the potential importance of contaminated canes as a source of infection.

1533. GOTTLIEB, D., AND HEUBERGER, J. W. 635.64: 632.48
Control of *Fusarium* wilt of tomato with Dithane.
Abstract in *Phytopathology*, 1946, **36**: 399.
Dithane when mixed with infested soil at 100 lb. per acre resulted in marked reduction of infection compared with check plots. In non-infected soils the fungicidal treatment did not prevent or reduce the germination of tomato seeds, but seedlings were stunted when grown in treated soils.

1534. STRONG, M. C. 635.64: 632.48
The effects of soil moisture and temperature on *Fusarium* wilt of tomato.
Phytopathology, 1946, **36**: 218-25, bibl. 19.
Field observations on the relation of rainfall to the incidence of *Fusarium* wilt, and greenhouse tests at constant soil moisture and temperature levels indicate that Marglobe, a resistant variety, and John Baer, a susceptible variety of tomato, have opposite responses to soil moisture with regard to susceptibility to wilt. When soil temperature conditions were constant and soil moisture conditions were changed, a reduction in soil moisture decreased the incidence of wilt in John Baer and increased it in Marglobe, while an increase in soil moisture increased incidence of wilt in John Baer and reduced it in Marglobe. The responses in wilt susceptibility to soil temperatures were similar in the two varieties.

1535. KREUTZER, W. A., AND BRYANT, L. R. 635.64: 632.411
Certain aspects of the epiphytology and control of tomato fruit rot caused by *Phytophthora capsici* Leonian.
Phytopathology, 1946, **36**: 320-39, bibl. 19.
Tests for the control of this tomato rot showed that mulching with straw, staking, or ridging resulted in more healthy fruit than corresponding controls. Significant control was obtained by dusting with 5% and 10% cuprous oxide and 10% copper oxychloride. Bordeaux spray 4-4-50 also effectively controlled the disease. The addition of copper sulphate to irrigation water at the time of soil inoculation indicated good control.

1536. BLANCHARD, —. 635.65: 581.142
Germinations anormales chez les légumineuses à grosses graines. Comportement en pleine terre des germes brisés ou anormaux issus de ces grains. **(Abnormal germination in large-seeded leguminous plants. The behaviour in open ground of young plants, broken or abnormal, growing out from these seeds.)**
C.R. Acad. Agric. Fr., 1946, **32**: 34-6.
Seeds of soybeans, broad beans, haricot beans, and peas were germinated according to the international rules for the analysis of seeds. At the end of the test the seeds were planted out in open ground. The results showed that many of the seeds considered as worthless under the rules were really capable of producing viable plants.

1537. PRICE, W. C., AND BLACK, L. M. 635.65: 632.8
The antigenicity of southern bean mosaic virus.
Phytopathology, 1946, **36**: 157-61.
Southern bean mosaic virus is antigenic and its precipitin reaction is useful in distinguishing it from other viruses that resemble it in some of their physical properties.

1538. YU, T. F. 635.651: 632.4
Powdery mildew of broad bean caused by *Erysiphe polygoni* DC. in Yunnan, China.
Phytopathology, 1946, **36**: 370-8.
Powdery mildew of broad beans is very prevalent in the bean-growing regions of southern Yunnan Province, in China. Though not of great economic importance, it does occasionally damage the crop, attacking leaves, petioles, stems and pods. The mildew on broad beans is able to infect peas, and it is considered that this is a single physiologic race attacking these two hosts. It is therefore named *Erysiphe polygoni* DC. *viciae pisi* forma nova.

1539. ANDREWS, F. W. 635.654: 632.4
Parasitism of *Striga* sp. on *Dolichos lablab* Linn.
Nature, 1946, **157**: 515.
In pot experiments it was found that the witchweed, *Striga hermonthica*, could parasitize the dolichos bean, *Dolichos lablab*, with consequent loss of crop.

1540. HILDEBRAND, A. A., AND KOCH, L. W. 635.655: 631.531.17
Seed treatment and other tests with soybeans in Ontario.
Abstract in *Phytopathology*, 1946, **36**: 401.
Spergon (3 oz. per bu.) accelerated and increased emergence of seedlings and increased yield.

1541. Houseman, E. E., Weber, C. R., and Federer, W. T. 635.655
Pre-harvest sampling of soybeans for yield and quality.
Res. Bull. Ia agric. Exp. Stat. **341,** 1946, pp. 807-26, bibl. 7.
The route-sampling method of estimating crop production has been extended to soybeans in a preliminary survey which is reported here. In 1941, just prior to harvest, 67 fields in eight east central Illinois counties were sampled for yield, percent protein, percent oil and iodine number of the oil. It was concluded that two subsampling units should be taken per field and that the optimum size of subsampling unit is approximately 7 square feet. Other investigations have shown that after the pods are fully distended there is little or no change in yield or chemical composition, indicating that production and quality can be estimated well in advance of harvest. [From authors' summary.]

1542. Carmin, J. 635.655
Trials with soybean in Palestine.
Bull. indep. biol. Lab. Kefar-Malal, 1946, Vol. **4,** No. 2, pp. 2-4, being abstract from *Hassadeh,* Vol. **22,** No. 9.
Results of trials with 12 soybean varieties, carried out at different localities in Palestine, are reported.

1543. Lehman, S. G. 635.655: 632.3
Control of bacterial pustule of soybean by dusting.
Abstract in *Phytopathology*, 1946, **36**: 405.
In experiments with various preparations only dusts containing copper reduced the disease. Plots dusted with copper yielded 4·9 bushels per acre more than plots not dusted.

1544. Allington, W. B. 635.655: 632.3
The relation of stomatal behaviour at the time of inoculation to the severity of infection of soybeans by *Xanthomonas phaseoli* var. *sojense* (Hedges) (Starr) Burk.).
Phytopathology, 1946, **36**: 385-6.
Results show that inoculation between 8 a.m. and 2 p.m. gives the greatest amount of infection. The conclusion is that the bacteria enter when the stomata are open.

1545. Porter, R. H. 635.655: 632.4
Induced baldhead in soybean.
Phytopathology, 1946, **36**: 168-70.
The data obtained in experiments described indicated that soybean seed of high germinability when planted in *Pythium*-infested soil with a moisture content of 15% and retained at 10° C. for 7 or 10 days may be expected to produce a high percentage of "baldhead" seedlings, in which the plumule is either killed or partially decayed.

1546. Schad, C., and Guignard, P. 632.78: 635.655
La pyrale des haricots (*Etiella zinckenella* Treitschke) parasite du soja dans le sud-ouest de la France. **(The lima bean pod borer attacking the soybean in the south-west of France.)**
Ann. Épiphyt., 1943, **9**: 169-75, bibl. 23.
The lima bean pod borer is recorded as attacking late and rather late varieties of soybean in Haute-Garonne and generally in the whole of south-west France. An account is given of its geographical distribution and host range. The plants from the later sowings were attacked more severely than those of the early sowings. The hyperparasites that attack the larvae of the pod borer are listed, but they are not considered to cause any appreciable reduction of the pest. Early sowing and the cultivation of resistant varieties are recommended. [See *H.A.*, 9: 13.]

1547. André, M. 635.655: 632.654.2
Sur les dommages causés en France aux cultures de soja par l'invasion d'un tetranyque. **(A mite attacking the soybean in France.)**
C.R. Acad. Agric. Fr., 1945, **31**: 463-4.
Soybeans in the neighbourhood of Paris and in the south-west of France have been severely damaged in recent years by the mite *Tetranychus urticae*, which also attacks many other cultivated plants, including lupin, hop, hollyhock, strawberry, peach, cucumber, melon and grapevine. The common nettle (*Urtica dioica*) is one of its host plants. Whatever control treatment is used it should be applied at the first signs of attack. Since the eggs are not generally destroyed, a second application is necessary in from 7 to 12 days, according to the temperature, which affects the hatching of the eggs.

1548. Hylmö, B. 635.656(48.5)
Sortförsök med trädgårdsärter vid Alnarp 1934-1942. **(Garden pea variety trials at Alnarp 1934-1942.)** [English summary 2½ pp.] Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1943, pp. 62, bibl. 13, being *Meddel. Trädgårdsförs.* **21.**
A report of the Swedish State variety trials with garden peas carried out at Alnarp during the period 1934-42 for most of the varieties and during the periods 1937-42 and 1940-42 for certain varieties which originated later. In the last three-year period practically all the varieties approved at Alnarp as first class were compared. Of these, 26 were bred in Sweden and 19 elsewhere.

1549. Kurgatnikov, M. M. 635.656: 581.192
The properties of starch from different varieties of peas. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 142-8.
Starch from peas was subjected to analysis and was found to vary greatly with the type of pea, e.g. smooth-skinned, wrinkled, etc.

1550. Wellensiek, S. J. 635.656: 581.14
De invloed der bladeren aan het steriele stengeldeel van Pisum op de ontwikkeling van de plant. **(The influence of the leaves on the sterile part of the stem on development in peas.)**
Overdr. Handelingen XXVIIIe Nederl. Natuur- en Geneeskundig Congres, pp. 161-4 [undated.]
An experiment was carried out on peas to determine the effect of removing one or more leaves from the stem on the development of buds and on the yield. The results are tabulated. The main practical conclusion drawn was that the removal of the leaf directly under the first fertile bud reduces the crop by 15%.

1551. Sčerbakov, A. P. 631.83: 581.12: 635.656
Abnormal respiration in plants resulting from insufficient potassium. [Russian.]
Biohimija (*Biochemistry*), 1945, **10**: 439-44.
During respiration etiolated peas which are deprived of potassium are able to draw upon nitrogenous substances instead of carbohydrates, even when the latter are present.

1552. Crosier, W. 632.4: 635.656 + 635.67
Chemical control of seed-borne fungi during germination testing of peas and sweet corn.
Phytopathology, 1946, **36**: 92-9, bibl. 9.
The relative fungicidal values of Arasan, Cerasan, du Pont 1452C, Semesan Jr., Spergon, and U.S. Rubber Compound No. 604 were investigated. Only the last caused any chemical injury detectable by size or development of the sweet corn seedlings, and it was the least efficient material in preventing *Diplodia zeae* from developing on seeds and destroying seedlings. It slightly excelled the other materials

n controlling moulds and bacteria on pea seeds and seedings, while only Semesan Jr. failed to effect a slight increase n both the germination of seeds and green weight of seedings. On the basis of green weight of seeds and seedlings Arasan and Ceresan excelled U.S.R. No. 604, Spergon and Semesan Jr. Arasan and Spergon permitted only 5% of he pea seeds to decay in soil naturally infested with *Fusaria*, *Pythium ultimum*, and *Rhizoctonia solani*. U.S.R. No. 604 appeared to provide slightly less protection against these fungi, while Ceresan and Semesan Jr. were significantly nferior to both Arasan and Spergon.

1553. BRINDLEY, T. A., AND OTHERS. 635.656: 632.76
The pea weevil and methods for its control.
Fmrs' Bull. U.S. Dep. Agric. **1971,** 1946, pp. 24.

Principal sources of pea weevil infestation, which constitutes a serious threat to pea production in many parts of the United States, are peas shattered on the field, volunteer peas, pea hay and weevil-infested seed. A 0·75% rotenone dust applied at the rate of 20 lb. per acre will control the pest, the number of applications required depending on the purpose for which the crop is grown. With peas harvested for processing it is important to prevent egg laying altogether, which may be achieved with one to three applications. Less rigid control is necessary in the case of peas grown for dry food or for seed. In Austrian Winter field peas one application of rotenone dust plus fumigation of the harvested seed has proved sufficient. For the timing of dusting and to determine the area to be treated, an insect-collecting net is used to estimate pea weevil populations. The hood or trailing apron, with which the power duster should be equipped, is described and pictured in detail.

1554. HUCKETT, H. C. 635.656: 632.753
Timing rotenone applications for control of the pea aphid on Long Island, with special reference to mosaic incidence.
Bull. N. York St. agric. Exp. Stat. **713,** 1945, pp. 30, bibl. 24.

Field observations are presented concerning the activities of the pea aphid, *Macrosiphum pisi* Kalt., on Long Island as influenced by weather conditions and crop development, and in relation to the incidence of virus diseases on peas as denoted by the symptoms. The data are based largely on records obtained in experimental plots near Hicksville, Nassau County, and near Riverhead, Suffolk County, during the years 1939 to 1944 inclusive. In comparative tests to determine the value of rotenone applications for pea aphid control as reflected in yield of pods and by their effect on the incidence of mosaic disease in the field, the results at Hicksville showed that one application made at the time when plants were coming into flower served to increase the average yield 26·9% over untreated plots, and to reduce the proportion of apparently diseased plants to 9·3% as compared with 17·7% in untreated plots. The results obtained at Riverhead, where the infestation of pea aphids was considerably lighter than at Hicksville, were inconclusive. [From author's abstract.]

1555. BARRONS, K. C., AND GRIGSBY, B. H. 635.656: 632.954
The control of weeds in canning peas with chemical sprays.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **28**: 145-56.

Recommendations are given, on the basis of experiments, (1) on annual weed eradication in canning peas with selective herbicides of the dinitro type (dinitro ortho secondary butyl phenol) and (2) on the control of Canada thistle and other perennial weeds with 2,4-D. In both cases the best results were obtained in warm weather, after the vines had dried off in the morning, when rain was not anticipated. The proprietary sprays of type (1) used were Sinox and G506 at concentrations of 1 gallon and 3 pints per 100 gallons respectively. High pressure should be avoided—in the trials a pressure of 40-125 lb. was employed—and weed nozzles giving a coarse fan-shaped spray should be used. The concentration recommended for 2,4-D is ¾ to 1 lb. of the acid per 100 gallons. As the chemical is injurious to peas, a knapsack sprayer for spot treatment is suitable equipment. The weed foliage should be thoroughly wetted at a time of active vegetative growth.

1556. ŠIMON, J. 635.75
Výsledky pokusů s českými a holandskými odrůdami kmínu v Brně. **(Results of trials with Bohemian and Dutch caraway varieties at Brno.)** [German summary ½ p.]
Reprinted from *Sborník české Akad. Zeměd.*, 1941, **16**: 95-100.

The trials were carried out in Moravia in 1935/36, 1936/37 and 1939/40. Caraway proved hardy even during the winter of 1939/40, when wheat and clover succumbed to the cold. Flowering lasted from the beginning of May to the middle or end of June, the seeds ripened between 25 June and 10 July according to season. The Dutch appeared to out-yield the Bohemian varieties tested, but seed quality was about equal. Caraway should follow a leguminous crop in the rotation.

1557. OLOFSSON, K. 632.76: 635.78
Snudebilleangreb paa Dild og Kruspersille. **(The *Ceutorrhynchidius terminatus* weevil in dill and parsley.)**
Reprinted from *Gartn.-Tid.*, 1945, Nr. 36, pp. 184-5, bibl. 5.

The life history of the weevil is described. The only control measure suggested is the removal of all affected plants as soon as symptoms of attack are observed.—J. E. Ohlsens Enkes Plantepatologiske Laboratorium, Copenhagen.

1558. ALLINGTON, W. B. 635.655: 632.8
a **Bud blight of soybean caused by the tobacco ring-spot virus.**
Phytopathology, 1946, **36**: 319-22.

b DUSTAN, A. G. 632.951: 635.1/7
The use of DDT on vegetable crops.
Processed Publ. Dep. Agric. Canada Div. Ent. **41,** 1946, pp. 4.

c HAUCK, C. W. 635.64: 658.8
Marketing Ohio tomatoes to processors on grades, 1930-1940.
Bull. Ohio agric. Exp. Stat. **623,** 1941, pp. 26.

d HILL, R. E. 633.491-2.76
Influence of food plants on fecundity, larval development and abundance of the tuber flea beetle in Nebraska.
Res. Bull. Neb. agric. Exp. Stat. **143,** 1946, pp. 16, bibl. 24.

e MOSK, S. A. 633.522
Subsidized hemp production in Spanish California.
Reprinted from *Agric. History*, 1939, **13**: 171-5, bibl. 11.

f PESOLA, V. A. 635.656
Ilo ja Paula. Uusia ruokahernejalosteita. **(Pea experiments in Finland.)**
Valt. Maatalousk. Tiedon., 1942, No. **184,** pp. 12.

g PENNY, N. M. 635.1/7
Vegetable production and marketing in Georgia mountain counties.
Bull. Ga agric. Exp. Stat. **240,** 1946, pp. 29.

ORNAMENTALS.

1559. O'Neill, H. 635.45
What is the true shamrock ?
Nature, 1946, **157**: 704-6.
Of all the plants rightly or wrongly identified with the shamrock only the wood-sorrel, *Oxalis acetosella*, may claim to be the shamrock of English literature. In the Irish and Scotch tradition, however, the shamrock is a clover, *Trifolium dubium*.

1560. Neergaard, P. 635.9: 632.4
Nye eller upaaagtede Prydplantesygdomme i Danmark. 13.-18. **(New or hitherto unnoticed diseases of ornamental plants in Denmark. 13-18.***)
Reprinted from *Gartn.-Tid.*, 1943, Nr. 8, pp. 95-8, bibl. 7.
In this third series diseases of the following plants were studied: (13) *Cissus antarctica*: *Gloeosporium physalospora*; (14) *Clarkia elegans*: *Peronospora arthuri*; (15) *Clivia miniata*: *Colletotrichum clivae*; (16) *Cucurbita pepo* and ornamental grasses: *Septoria cucurbitacearum*; (17) *Hedera helix* v. *hibernica* f. *variegata*: *Amerosporium trichellum*; (18) *Viola tricolor* v. *hiemalis*: *Centrospora macrospora* nov. comb. Control measures were also studied.—J. Ohlsens Enkes Plantepatologiske Laboratorium.

1561. Cory, E. N. 585.94: 632.752
Control of several scales infesting orchids.
J. econ. Ent., 1945, **38**: 395.
DDT spray proved harmless to a number of orchid species but deadly to eight species of scales infesting them. The treatment used and the species included in the experiment are specified.

1562. Barthelet, J. 633.526.2-2.4
L'anthracnose des agaves. **(Anthracnose of agaves.)**
Ann. Épiphyt., 1942, **8**: 111-20, bibl. 18.
The agaves of the Riviera (south-east France) are attacked by various fungi; of these the most important is *Colletotrichum agave* Cavara which causes anthracnose of the leaves. The disease is first seen as slightly depressed light brown spots, scarcely visible on agaves with dark leaves such as *Agave rigida* but very distinct on the yellow areas of the *variegata* forms of *A. americana*. The lesions are sometimes isolated, but in severe attacks they coalesce to form large zones occupying the whole width of the leaf. The spots or zones are surrounded by a light green " halo ". Later the central parts of the spots become whitish and concentric circles of conidia-bearing stromas appear on them. The disease detracts from the appearance of ornamental species. It may become serious on species cultivated for their fibres which become brittle and do not separate from the surrounding tissues. Sisal (*Agave rigida* Miller) is particularly susceptible. The removal and burning of affected leaves is recommended and on ornamental agaves a copper spray may be applied. Other fungi parasitic on agaves are mentioned.

1563. Thompson, J. M. 635.976.33
Some features of horticultural interest in the forsythias.
J. roy. hort. Soc., 1946, **71**: 166-72.
Points discussed include: (1) Relation between bud formation and flowering in several *Forsythia* species and hybrids; (2) development of nodules on shoot and root formation from these nodules in cuttings and layers (illustrated).

1564. Doucette, C. F., and Latta, R. 635.935.722: 632.761
The lily weevil, a potentially serious pest in the Pacific Northwest.
Circ. U.S. Dep. Agric. **746**, 1946, pp. 24, bibl. 4.
A primarily biological study of the lily weevil, *Agasphaerops nigra*, the larvae of which injure bulbs and underground stems of wild and cultivated lilies. The weevil is a potential danger to growers along the Pacific coast from Vancouver Island to northern California. The pest is effectively controlled in its adult stage by spraying with a stomach poison, e.g. lead arsenate at the rate of 2 lb. to 50 gallons of water plus suitable spreader, as soon as feeding is evident on the foliage late in March or early in April. Ordinarily, 5 applications at 10-day intervals are required to cover the young growth.

1565. LeBeau, F. J. 635.944: 632.4
The eradicant action of a fungicide on *Colletotrichum lilii* in lily bulbs.
Phytopathology, 1946, **36**: 391-3.
In laboratory trials two materials, Puratized N5X and its improved form N5E (10% phenyl mercuri triethanol ammonium lactate) at concentrations of 1-500 to 1-4,000 where the treatment time was 24 to 48 hours, proved effective in killing the fungus in the scales. Field trials with bulbs treated with N5E gave satisfactory stands and results indicated that the material can be used in the field with safety.

1566. Gray, A. 635.944
Miniature daffodils.
J. roy. hort. Soc., 1946, **71**: 154-65.
The beauty of dwarf daffodils—i.e. of plants up to a height of 6 or 7 in. with a flower not exceeding 2 in. across—is in the author's view not sufficiently appreciated. His excellent photos and colourful descriptions of species and varieties will be an invitation to many garden lovers to grow these dainty plants more abundantly both for indoor decorative purposes and for borders and naturalization.

1567. Wasscher, J. 635.944: 631.521
De moeilijkheden bij de zaadwinning en selectie bij *Cyclamen persicum*. **(The difficulties in obtaining seed and in the selection of *Cyclamen persicum*.)**
Meded. Direct. Tuinb., 1946, pp. 402-8, 460-7, bibl. 15.
The work on breeding and propagating cyclamen at the Aalsmeer experiment garden is outlined: and descriptions are given of (1) the various cultivated forms of *Cyclamen persicum*, (2) the method of pollinating the flowers by hand (3) the treatment of the seed-producing plants. The seedlings show great variation and hints are given on the selection of seedlings and on the merits of selfing and crossing.

1568. Langdon, R. F., and Herbert, D. A. 635.944: 632.4
Records of Queensland fungi. IV.
Univ. Qd Pap. Dep. Biol., 1944, Vol. **2**, No. 4, 4 pp., 1s.
The fungi recorded here include gladiolus smut (*Urocystis gladioli*). It is thought to be widely spread in Australia. The disease appears on corms, stems and leaves. Reference is made to the Dutch method of control by dipping the corms for not more than half an hour in water at 110° F.

1569. Guba, E. F. 635.936.69: 632.4
Carnation wilt diseases and their control.
Bull. Mass. agric. Exp. Stat. **427**, 1945, pp. 64, bibl. 84.
The important fungous diseases of carnations in Massachusetts are spot, blight, and canker caused by *Alternaria dianthi*; root, crown, or foot rot caused by *Fusarium culmorum*, *F. avenaceum* and other species of *Fusarium*. *Fusarium* branch rot or wilt caused by *Fusarium dianthi* and stem rot caused by *Rhizoctonia solani*. Distinctive symptoms of disease are associated with each pathogen and wilting is common to all. All of these pathogens attack both cuttings and plants in various subsequent stages. The cut surface at the base of the cutting is a favoured poin

* For 1-8 see *ibidem*, 1938, 54: 395-400; 9-12, *ibidem*, 1940, 56: 218-21.

attack. The use of new and clean sand after each crop rooted cuttings is recommended, but the possibility is ot excluded of using old sand again. Immersion of the ttings for 15 minutes in a 1-1,000 solution of potassium rmanganate, ¼ ounce to 2 gallons of water, encourages oting and provides some degree of disinfection of super-ial inoculum conveyed by the cuttings to the sand. No gnificant advantage was shown from treating the cuttings ith both a hormone material and potassium permanganate. owdering the base of the cuttings with a 10% Fermate or rasan dust gave good control of wilt caused by the fungus *dianthi* without harming root action. All-year culture the greenhouse is an effective method of controlling *lternaria* blight. Growing in the open increases the zards from disease. Care in lifting and transplanting avoid breakage is an important disease control measure. tting the plants deeper than the roots at any of the stages culture encourages infection, notably by the *Rhizoctonia* m rot fungus. Segregation of the two classes of stock is sirable, and a house devoted wholly to young plants is commended. Distinct contrasts in the susceptibility of rnation varieties to *Alternaria dianthi* and *Fusarium anthi* are shown. The subject of soil sterilization with at and chemicals in relation to disease and weed control reviewed. The effect of treating new and used soil in the nches with chloropicrin was not significant when the ants were grown in the field in apparently infested soil. he sterilization of the potting and flatting soil by any ceptable method is very desirable. Powdered naphtha-he, copper compounds, and calcium arsenate are lethal the conidia of *Alternaria dianthi*. Good control of *lternaria* blight was shown in small-scale tests with rdeaux combined with calcium arsenate and fish oil, and ith dusting mixtures containing naphthalene, calcium senate, monohydrated copper sulphate, and lime. In idemic years significant control of blight in the field as shown by protective treatments with bordeaux mixture 4-50 combined with calcium arsenate 1 lb. and Penetrol pint. Increases in yields of flowers are shown. Calcium senate alone was injurious. Dusting materials gave satisfactory control. Satisfactory results from spraying quire frequent treatments with a power sprayer beginning ter planting out in May and continuing until benching he in the greenhouse, or early July. Spraying treatments e desirable for susceptible varieties, but only where field ltivation is practised. [From author's summary.]

70. Oliver, R. W. 635.937.34(71)
Outdoor roses in Canada.
Publ. Dep. Agric. Canada **777**, 1946, pp. 34, being *Fmrs' Bull.* **133.**

his is a comprehensive guide for Canadian garden lovers no seek information on the growing of roses outdoors. he bulletin is full of practical suggestions for many opera-ons. Concerning the rooting of cuttings, for instance, here only a few are desired:—Take a 6-in. flower pot and t a plug in the hole in the bottom. Put some stones in the ttom of a 9-in. pot with some sand on top and place the in. pot on the sand so that the latter's top is ½ in. lower an the 9-in. pot. The space between the two pots is filled th sand and the cuttings are planted. The 6-in. pot is pt filled with water to provide constant moisture in the r surrounding the cuttings. Special features are (1) a map Canada showing 4 zones according to the type of winter otection required. Zone I, where only hardy shrub ses may be left in permanent beds with due protection, tends practically all over the country, including the uthern border, while Zone IV, where only tea roses quire protection, is confined to a few spots. (2) Question-ires were sent out to prominent rose growers in the ominion asking them to indicate what they considered the st 6 varieties in each class. The result is a variety list, hich notes the points received. (3) In order to stimulate terest in shrub roses, of which many people seem to select only the old standbys, over 4 pages are devoted to the description of hardy shrub varieties, a group that is particularly suitable for most parts of Canada.

1571. Volz, E. C. 635.937.34
Growing garden roses.
Bull. Ia agric. Exp. Stat. **P76,** 1945, pp. 531-55.

Evidently, the primary purpose of this well illustrated bulletin is to help the amateur to make the best of his rose garden. Specialists may be interested in the recommended list of roses for planting in the cold climate of Iowa, amplified by remarks on hardiness or the degree of protection the different types require. All-America rose selections are continually tested in the trial gardens of the Floriculture Subsection at the Iowa State College and the behaviour under Iowa conditions of 18 recently introduced varieties is detailed.

1572. Baker, K. F., and Thomas, H. E. 635.937.34: 632.4
Failure of bud and graft unions of rose induced by *Chalaropsis thielavioides*.
Phytopathology, 1946, **36**: 281-91, bibl. 21.

Black mould, *Chalaropsis thielavioides*, caused failure of bud unions in several rose fields, and of grafts in one greenhouse in California. Infected buds are quickly killed and blackened, and the cut surfaces of scion and stock are blackened and the union is prevented. The rose form of the fungus is pathogenic to many other roses and woody plants. The lupin, walnut [see *H.A.*, 5: 396], and Chinese elm forms are non-pathogenic to rose.

1573. Kičunov, N. I. 635.937.34: 633.85
A valuable rose for the production of rose oil. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 3, pp. 145-6.

Rosa damascena Mill., which is cultivated in Bulgaria, is not sufficiently hardy for any but the warmest regions of the U.S.S.R. It is believed that Parfum de l'Hay, for a description of which the reader is referred to the 1919 Annual of the American Rose Society, is likely to prove hardy in many parts of the Union. It flowers throughout the summer. According to the Rose Society's Annual, the petals of Mistress Curson yield more oil than those of Parfum de l'Hay, but the variety blooms only for a short period in spring.

1574. Sumnevič, G. P. 635.937.34
New roses from Uzbekistan. [Russian and Latin.]
J. Bot. U.R.S.S., 1945, **30**: 273-7.

Five species are described, the habitat of each being defined.

1575. Thomas, H. E., and Hansen, H. N. 635.938.23: 632.48
Camellia flower blight.
Phytopathology, 1946, **36**: 380-1.

This disease, caused by *Sclerotinia camelliae* Hara, affects the open flowers and destroys them. It should be possible to eliminate the fungus by systematic destruction of infected flowers possibly supplemented by ground spraying. Discretion should be observed in moving balled or boxed plants from infested to non-infested areas.

1576. Baker, K. F., and Locke, W. F. 635.939.98: 632.4
Perithecia of powdery mildew on zinnia seed.
Phytopathology, 1946, **36**: 378-80.

In zinnia seed fields in two Californian counties as the result of ineffective control powdery mildew (*Erysiphe cichoraceae-rum*) developed copiously in the flower heads and there produced abundant perithecia. Such infections may

greatly reduce the yield and quality of the seed. The disease is relatively easy to control by frequent dusting with sulphur.

1577. MUNRO, M. C. D. 635.965: 632.411
A root rot of cineraria, and a study of the species of *Phytophthora* concerned.
Trans. Brit. myc. Soc., 1945, **28**: 115-26, bibl. 7.

Many Ayrshire (Scotland) nurserymen before the war lost much of their stocks of Cineraria from a root rot disease associated with wilting of the leaves. A study of the disease shows that the lower leaves are affected first, while still retaining their green colour; later the young leaves droop. The central axis of the plant usually remains upright. The roots of affected plants are pinkish; in advanced stages of the disease they are brown with a soft, odourless rot. Of various fungi isolated from diseased plants *Phytophthora cinnamomi* most rapidly produced symptoms of root rot. *P. cambivora* was less virulent.

1578. WILSON, M., AND ROBERTSON, N. 635.967.2: 632.4
Crown rot of *Gentiana bernardii*.
Gdnrs' Chron., 1946, **119**: 90-1.

A crown rot of cultivated gentians, particularly *G. bernardii*, is described and attributed to infection by *Leptothyrium gentianaecolum* Bäuml. which was found on leaves of affected plants. There is a suggestion that spraying (Shirlan and half-strength bordeaux mixture were used) checks the disease.

1579. RODENBURG, J. W. M., AND VAN DER SMAN, A. M. 635.976.34: 632.48
Proeven over een voetziekte van *Euphorbia fulgens*. **(Experiments with footrot of *Euphorbia fulgens*.)**
Meded. Direct. Tuinb., 1946, pp. 328-31.

The symptoms of this disease of *Euphorbia fulgens* are sudden wilting, the base of the stem is brown, sometim blueish green, pith brown or destroyed; the roots may sound, but often it appeared that the disease entered t plant through the roots. The disease is caused by *Fusariu solani*. Experiments showed that the chances of infectio can be reduced by propagating plants in steam-sterilized so

1580. NICOLAS, G., AND AGGERY, —. 635.977.6: 632.3
Une maladie nouvelle du micocoulier (*Celtis australis*). **(A new disease of the nettle tree.)**
C.R. Acad. Agric. Fr., 1945, **31**: 222-4.

A new disease of the nettle tree is recorded in which reddi grey circular spots appear on the leaves in June. When t spots are numerous they become confluent and the leav may become rolled; the spots are rarely seen on the fru stalks and on the fruit themselves. Numerous bacter were found in the lesions and the suggestion is made th infection is caused by flies bringing pathogenic bacter from a dunghill nearby.

1581. PALMGÅRD, A. 635.9(48.5)
a Blomsterodlingens utveckling. **(The development of flower growing in Sweden.)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok, 1942, Stockholm, 1943, pp. 82-7.

CITRUS AND SUB-TROPICALS.

1582. (MES, M. G., AND SCOTT, E. J.) 634.3: 581.14
Citrus trees in test tubes: studies of the growth and root formation of citrus.
Citrus Gr., 1946, No. 144, pp. 1-4.

This is a preliminary account of work conducted by Dr. M. G. Mes and Miss E. J. Scott at Pretoria University. Half-inch tips of the stems of 3-week-old citrus seedlings were grown in culture tubes containing a medium consisting of various mineral salts, sugar and vitamins. The tips germinated and were grown at first in the dark; the leaves expanded only after the tubes were transferred to light. By this test-tube method it will be possible to study the influence of light, temperature, sugar, vitamins, auxin, minerals, etc., on the formation and growth of roots, leaves, buds and stems.

1583. BRODSKI, —. 634.31: 581.056: 577.16
Influence du climat sur la richesse des oranges en acide ascorbique. **(Influence of climate on the ascorbic acid content of oranges.)**
C.R. Acad. Agric. Fr., 1945, **31**: 409-13.

The ascorbic acid content of oranges grown in Morocco was found to vary according to the region in which the fruit was grown, the regions being, (1) a coastal zone (altitude 15 m.), (2) a continental zone (alt. 550 m.) and (3) a semi-arid zone (alt. 460 m.). The results, set out in tables, show that the ascorbic acid content of oranges from the continental and the semi-arid zones was higher than that of fruit from the coastal zone. The difference seems to be due to the fact that the coastal zone received less sunshine (2,336 hours) than the other two zones (2,701 hours). Under the same climatic and soil conditions the ascorbic acid content of the fruit varied with the varieties, but the effect of different rootstocks was unimportant.

1584. OPPENHEIMER, H. R. 634.322: 581.162.3
Unfruitfulness of Clementines. [Hebrew.]
Hameshek hakhaklay, 1943/44, Vol. V, Nos. 1, 2-3, 4, 6.

Many Clementine trees in Palestine, although profusely blooming in March, shed their fruitlets (about 3 m diameter) before June. Sometimes an off-bloom in la summer results in an undesirable crop in spring. U fruitfulness often increases as the tree grows older. Fruitf and unfruitful trees are seen side by side in the same gro As to the probable causes, lack of oxygen in waterlogg soil is excluded, as most Clementine groves in Palestine a on light soil. Insufficient irrigation is excluded too, sin ample early water has not eliminated unfruitfulness in fie experiments. Dry hot winds (hamseens) blowing in sprin while certainly favouring the shedding of the fruitlets, not every year reach a dangerous intensity, nor can th account for differential fruitfulness of neighbouring tre Nor can exposure of trees or soil texture or compositi account for the phenomenon which occurs in trees differen sited and on different soils. Since unfruitful trees different stocks are met with, stock is unlikely to play important part in unfruitfulness. Experiments of ro pruning and manuring with phosphate and/or pota carried out in order to establish whether a relative excess nitrogen is the main cause, yielded negative results. Af one year the leaves turned yellow and were shed. Possi there are unfruitful clones and therefore only carefu selected bud wood should be used. Sometimes, accord to growers, the same bud wood, under different conditio yields fruitful as well as unfruitful trees. Evidence fr observations in groves pointed to *self-incompatibility* unfruitful clones as the main cause of the trouble. Polli tion experiments involving more than 900 flowers h confirmed this impression. Pollen of Dancy and Youss Effendy tangerines and of one Clementine tree known to fruitful were found effective in producing fruit set. Orig ally unfruitful trees bear a crop of seeded fruits w interplanted with seed-producing mandarin and, to a sma degree, orange and lemon varieties. The number of se is found to vary according to the different pollen pare The number of fruits set, as well as that of seeds per fr decrease with increasing distance from a good pollina The presence of bees seems essential. Prelimin

periments with pollen of unfruitful Clementines showed a v percentage of germination (5 to 10% in 10-15% sugar utions at 30° C.). Few fruits observed after self-pollination were seedless. It is likely that unfruitfulness in the ementine is influenced by both internal and external tors. Hormone production by the generative tissues d concentration of assimilated food in trees are supposed be the main internal factors involved. This might well plain why girdling, by raising the concentration of the trients, is useful in some cases, though by no means in all. th the amount of evidence available no definite practical ggestions can as yet be given.—H.R.O. [author].

35. SWART, H. C. 634.3-1.8
Fertilizing and manuring of citrus orchards in the Rustenburg area. [In English and Afrikaans.]
Citrus Gr., 1946, No. 146, p. 4.
is is the first of a series of articles which will outline for ch of the main citrus areas in the Transvaal (1) the plication of fertilizers and manures, (2) pest control, irrigation and cultivation. Cattle manure should be plied annually to all citrus varieties, and, in some cases, o phosphate and lime and nitrogen. When nitrogen is cessary, strong preference must be given to nitrochalk d sodium nitrate; if these are unobtainable use ammonium phate, or ammonium sulphate preceded by an application lime.

36. BATHURST, A. C. 634.3-2.19: 631.855
Die uitwerking van superfosfaat op lemoenbome.
(The effect of superphosphate on citrus trees.)
Citrus Gr., 1946, No. 146, pp. 11-12, bibl. 3.
scribes experiments in which applications of superosphate increased mottle-leaf.

37. MYERS, L. F. 631.67: 634.1/3
Summer irrigation.
Fruit World, Aust., 1946, **47**: 2: 5.
otes are given on irrigating citrus, apricots and peaches th special reference to the " crowder " system, i.e. a bank either side of the tree. A variation of this method is to ve two crowder banks about 6 feet apart in each bay and use this more or less as a carrying ditch, starting at the ttom of the run and working back to the ditch. The vantage of this method is that it gives very good control the water applied.

38. SMOYER, K. M., AND HALMA, F. F. 634.3-2.19-1.541.11
The rootstock factor in quick decline.
Calif. Citrogr., 1946, **31**: 249, 282.
is is an account of a 2-year survey of citrus orchards ected with quick decline in Los Angeles County, California. ly Navel and Valencia orange on sour orange rootstock re affected. Sweet orange, probably grapefruit and ssibly trifoliate and rough lemon are either highly resistant immune. Definite symptoms of the disease were found y on trees 3 years and older. There is some evidence t Eureka lemon is not susceptible.

39. FAWCETT, H. S., AND OTHERS. 634.3-2.19
A progress report on quick decline studies.
Calif. Citrogr., 1946, **31**: 198-9, 207, 210-5.
is report is contributed by five workers of the Division of nt Pathology, Citrus Experiment Station, California. e symptoms of quick decline are first seen as a yellowish en or dull ashen colour of the foliage, and frequently a large crop of fruit and, if the fruit is about to mature, a premature colouring of the oranges. Later, the leaves in to curl upward along the mid vein and drop off, and he twigs die back. The disease has been found with tainty only on trees of sour orange stock. An iodine shows that the roots of affected trees become depleted starch; this test, while useful in indicating the onset of ck decline, is not in itself an invariable symptom of the ease, for the loss in starch may be caused by other agencies. In the early stages of the disease the sieve tubes of the phloem, with the exception of a few immature sieve tubes near the cambium, collapse at, and immediately below, the bud union. The diseased material has generally a lower rate of respiration than healthy material. Various fungi have been isolated from affected roots, but inoculation experiments have not offered any evidence that any of the organisms are the primary cause of the disease. It is believed that soil organisms are only indirectly involved in quick decline and that their rôle is a secondary one of attacking and breaking down roots that become susceptible because of a shortage of either food or other essential substances normally supplied by the top. Inoculation tests by grafting, budding, etc., between diseased and healthy trees have, as yet, given no evidence that quick decline can be transmitted in that way.

1590. ROHRBAUGH, P. W. 634.3-2.19
Mineral nutrient deficiencies in California citrus trees and their causes.
Calif. Citrogr., 1946, **31**: 201, 225-8.
This is an account in popular language of the soil reaction, and of soil treatment to render the ground suitable for citrus growing. The citrus soils of Florida (generally acid) and those of California (alkaline) are compared, with particular reference to the fertilizers necessary to reduce the pH of the Californian soils so as to render available in them the elements which are already abundant but unavailable owing to soil reaction.

1591. MOORE, P. 634.3-1.51
Grass roots views on non-cultivation.
Calif. Citrogr., 1946, **31**: 200, 218.
The advantages of clean non-cultivation in citrus orchards are set out, and certain general rules are drawn up for those who are about to practise it. Orchards should be thoroughly cultivated and floated to level out irregularities in grade before putting in permanent furrows. Broad shallow furrows are best adapted to non-cultivated orchards. If accumulated water from higher ground crosses the orchard, or is accumulated in natural drainage ways within the orchard, provision should be made to divert it or handle it in grassed water ways to prevent erosion. Weeds should be sprayed while they are small—2 to 4 inches high—or, in the case of low growing plants, before they go to seed. Low grade orchard heater oil is the best general weed killer. During the first few years, in orchards having heavy weed growth, boom sprayers have been most efficient in eliminating weeds, but after the weed population is reduced it is more economical to use hand operated guns.

1592. FAWCETT, G. L. 634.31-2.85
Notas sobre la podredumbre de las raicillas o " tristeza " de los naranjos. **(Root rot of oranges.)**
Rev. industr. agric. Tucuman, 1945, **35**: 33-5, bibl. 6.
Root rot of oranges, or tristeza, does not occur in Tucuman, but if it is contagious, as seems probable, it is almost certain to appear at some future time in the province. Its cause is at present unknown, though various suggestions have been put forward. It occurs only on sweet oranges or mandarins grafted on bitter orange [*Citrus aurantium*] rootstock, but, as this combination can be found on all orange estates in Tucuman, it indicates that there is no lack of affinity between the bitter orange rootstock and the sweet orange scion.

1593. KLOTZ, L. J., CALAVAN, E. C., AND ZENTMYER, G. A. 634.334-2.482
The effect of *Botrytis* rot on lemons.
Calif. Citrogr., 1946, **31**: 247, 262.
In overcast and rainy weather in April and May lemon petals become heavily infected with *Botrytis cinerea*; they fall and lodge on the fruit and start decay. Botrytis may cause serious losses of lemons in storage; decay usually starts in

individual fruits, infected through wounds on the stem end, and spreads to adjacent sound lemons by contact, producing large, adhering nests of rotten lemons. Hot water with soda ash has been found to be effective against Botrytis. Other precautions are (1) care in avoiding contamination of field boxes and fruit with soil during picking operations; (2) care in handling and removing freshly wounded lemons at the washer; (3) the avoidance of excessive humidity and of condensation of moisture in storage; and (4) prompt removal of the decay in the stacks.

1594. SHAH, R. 634.1/3-2.78
An effective and inexpensive method for the control of stem-borers in fruit trees, with special reference to santra trees in C.P. and Berar.
Curr. Sci., 1946, **15**: 135.
The method described is for the control of *Indrabela quadrinotata*, the caterpillars of which bore into the stems of santra (*Citrus suntara* Engl.). It consists in introducing hot water through the opening leading to the tunnel of the stem-borer by means of an ordinary tin-syringe, taking care to flood fully the inside of the tunnel. The holes are plugged the following day with cement or with clay mixed with cow dung.

1595. MARTIN, J. P. 577.15.04: 632.95
The hormone weed killer 2,4-D.
Calif. Citrogr., 1946, **31**: 248, 264.
The hormone weed killer, 2.4-dichlorophenoxyacetic acid, is very toxic to citrus roots; it readily leaches through soils and is slowly decomposed by some soil organisms. As little as 1 p.p.m. on a dry soil exerted a toxic effect on citrus seedlings, and 5 p.p.m. was sufficient to kill them. Growers are urged to use this material sparingly. It would seem preferable to spray weeds after, rather than before, an irrigation, so as to allow time for such 2,4-D as becomes incorporated into the soil to be largely decomposed before the next irrigation.

1596. SCHROEDER, C. A. 634.1/7
The nomenclature of certain subtropical fruits.
Yearb. Calif. Avocado Soc. for 1945, pp. 36-40.
Notes are given of the names of a number of fruits. In each case the preferred name is given first. This is followed by the botanical name and then by synonyms. Loquat (*Eriobotrya japonica*) or Japanese medlar, Japanese plum or biwa; feijoa (*Feijoa sellowiana*) or pineapple guava; cherimoya (*Annona cherimola*) or cherimoyer, chirimoya, custard apple; Macadamia nut (*Macadamia ternifolia*) or Australian nut, macadamia, or Queensland nut; white sapote (*Casimiroa edulis*) or Mexican peach, Mexican apple, cochil sapote; African carissa (*Carissa grandiflora*), Natal plum, carissa, amatungula, governor's thorn; guava (*Psidium guajava*), lemon guava, tropical guava, pea guava, yellow guava, Florida guava; tuna (*Opuntia* spp.), prickly pear, Indian fig, barbary fig, cactus apple, panini; purple passion fruit (*Passiflora edulis*), purple granadilla or sweet cup; cattley guava (*Psidium cattleyanum*), strawberry guava; kaki-persimmon (*Diospyrus kaki*), oriental persimmon, Japanese persimmon, kaki, date-plum, Japanese date plum, keg fig.

1597. FERNANDEZ GIANOTTI, A. A., AND FERREIRA, J. J. 634.3-1.541.11/12
Plan de ensayos comparativos de portainjertos e injertos en plantas cítricas y afines, de la Dirección de Frutas, Hortalizas y Flores. **(The plan of comparative rootstock trials for citrus and related species to be set out by the Division of Fruits, Vegetables and Flowers, Buenos Aires.)**
Bol. Frut. Hort. Flor., Buenos Aires, No. 92, pp. 139-44. Reprinted from *Ingen. agron.*, 1945, 7: 139-44.
This article announces and gives the plan of grafting experiments about to be started by the Division of Fruits, Vegetables and Flowers, with the collaboration of Office of Administration of Experimental Stations of Ministry of Agriculture, Argentina.

1598. EZELL, B. D., AND WILCOX, M. S. 633.492: 577.16
The ratio of carotene to carotenoid pigments in sweet-potato varieties.
Science, 1946, **103**: 193-4, bibl. 7.
In the varieties tested, the carotene/total pigment r increased with increase in intensity of yellow colour.

1599. WRIGHT, R. E. 633.492
Studies on sweet potato production in Texas.
Bull. Tex. agric. Exp. Stat. **668**, 1945, pp. 15, bibl. 10.
The bulletin has been written for Texas growers as a sou of information on the practices now recommended by Experiment Station. Emphasis is laid on the importa of seed selection, disease control by seed treatment, e planting (about mid-April), adequate fertilizing, c cultivation in the early stages before damage to the v occurs, care in handling the roots, sanitation of the sto house, etc. Most of the recommendations are suppo by data. The utilization of culls and vines for feed purposes is also discussed.

1600. SPEIRS, M., AND OTHERS. 633.492: 631.8: 577.16
The effects of fertilizer treatments, curing, storage, and cooking on the carotene and ascorbic acid content of sweetpotatoes.
Southern Coop. Bull. Ser. **3**, 1945, pp. 31, bibl. 20.
Sweet potatoes of the Unit I Porto Rico variety reta their original carotene content from time of harvest thro curing and six months of storage under controlled conditi A slight loss of carotene, 9·9%, occurred on boiling w roots, and a greater loss, 23·9%, resulted from bak The ascorbic acid content of this variety at harvest reduced 17% by curing. A progressive loss of ascc acid, about 6% of the original content in a month, occu during storage. Neither boiling nor baking whole s potatoes caused any loss of ascorbic acid. Fertiliza with various combinations of N, P, K and Ca had relati little effect on the moisture, carotene, or ascorbic content of this variety of sweet potato. Significant v tions in composition were found between individual s potatoes and also between root, center, and stem transv sections. [Authors' summary.]—The work was co-op tively conducted by the Georgia and North Caro Agricultural Experiment Stations.

1601. NUSBAUM, C. J. 633.492-2.19: 546.27
Internal brown spot, a boron deficiency disease of sweet potato.
Phytopathology, 1946, **36**: 164-7.
Observations are recorded on a disorder of sweet pot grown on experimental plots, some of which had rec various amounts of borax. This disorder, internal b spot, characterized primarily by the occurrence of b necrotic areas in the flesh of the roots, appeared onl plants not supplied with borax, and is attributed, there to boron deficiency. Symptoms on vines and l appeared in the latter part of August, about two m after planting, when some of the plants on no-borax showed a restriction of terminal growth and shorteni the internodes; later the petioles became curled an terminals stunted and distorted. In October many c terminals died and vine growth ceased; the older l turned yellow and shed from the vines, exposing the c of the plants. At digging time the roots of affected p showed varying degrees of both external and int degeneration; in outward appearance they were missh and the skin was rough and leathery in texture.

2. Jeffers, W. F., and Cox, C. E. 633.492-1.531.17
Comparison of several fungicides as dips for seed sweet potatoes.
Abstract in *Phytopathology*, 1946, **36**: 402.
standing in two seasons were Spergon (1 lb./4 gal.) and rgon (0·5 lb./4 gal.).

3. Teixeira Mendes, P. 633.85
Obtenção de mudas de tungue. **(Raising tung seedlings.)**
Rev. Agric. S. Paulo, 1946, **21**: 158-63.
cess in tung culture [*Aleurites* spp.] depends largely on quality of the seedlings, and that of the seed. One of chief points is to get the seeds from healthy, productive s, and remove them from the fruit only shortly before ring, for their power of germination decreases rapidly n the second or third month after the fruit has been ected. Sowing the seed direct in the field is inadvisable, it hinders selection of the best plants. The extra cost aising plants in the nursery is well repaid. Sandy soils to be preferred for the nursery and a good supply of er is necessary. The nursery should be exposed to full shine. After sowing, however, it is advisable to cover ground with a layer of straw to maintain humidity until seedlings appear. Germination is slow, the first dlings appearing generally in 4 or 5 weeks, but thereafter elopment is rapid and the seedlings are soon ready for fting (when about 1 cm. in diameter). The grafting is e low down, using an inverted T method.

4. de Arruda Veiga, Alceu. 633.88.11.871
Eucalyptus citriodora. **(The lemon-scented gum.)**
Rev. Agric. S. Paulo, 1946, **21**: 154-7.
rief account of raising plants of *Eucalyptus citriodora* by ing seeds in small matchbox-wood boxes, two or three ach. The seedlings germinate in ten days and seedlings e been transplanted with good results 10 days after mination.

5. Aldrich, W. W., Crawford, C. L., and Moore, D. C. 634.62: 581.14: 631.432
Leaf elongation and fruit growth of the Deglet Noor date in relation to soil-moisture deficiency.
J. agric. Res., 1946, **72**: 189-99, bibl. 11.
rate of elongation of recently emerged leaves was found e fairly constant from late May to October. A prolonged rease in rate of leaf elongation of 0·5 to 1 cm. or more day below that of frequently irrigated palms during late y, June, July and early August, when the fruits were arging, was always accompanied by a reduced rate of ease in fresh weight and by limitation in the final fresh ght of the fruits. The rate of increase in dry weight of fruits did not fall immediately as much as that of fresh ght, so that the percentage water content of the fruits temporarily reduced. Appreciable water deficits in the m during June, July or early August, when the fruits are ceptible to the high relative humidity or rain injuries own as checking and blacknose, resulted in fewer fruits eloping these injuries than on palms receiving adequate gation. Appreciable water deficits in the palms for a gle period in the summer did not greatly increase the ivel of ripe fruits. [From authors' summary.]

6. Aldrich, W. W., and others. 634.62-2.19
Checking of fruits of the Deglet Noor date in relation to water deficit in the palm.
J. agric. Res., 1946, **72**: 211-31, bibl. 14.
cracking that appears on the surface of date fruits *oenix dactylifera*) during summer after a period of rain high relative humidity is known as checking. On the glet Noor variety such checking, if severe, may eventually se a darkening and shrivelling called blacknose. The ount of checking of both detached fruits and fruits on palm was studied in relation to the internal water supply of the fruit and to the water in the medium surrounding the fruit. Fruits detached from the palm in the morning developed checking after immersion in water for 4 hours. The period of fruit susceptibility to checking began in June and ended in August, when the fruit colour had changed from yellowish green to pink. When fruits detached in the morning were immersed in 1·5, 1·7 and 1·9 molal sucrose solutions, they decreased in weight but developed checking nearly as readily as fruits immersed in water. It is suggested that during immersion the rate of water movement from the peripheral cells through the cuticle to the sucrose solution was slower than the rate of water movement from the interior of the fruit to these peripheral cells, resulting in excessive turgor and rupture of the cells. Fruits collected in the morning and covered with paraffin checked as much in air as comparable fruits immersed in water, showing that checking can occur without the entrance of water through the surface of the fruit. When fruit on detached strands were exposed to air at high relative humidities the checking was greater if water was supplied to the cut end of the strand, indicating the importance of water movement to the fruit through its vascular system as a cause of checking. In a series of irrigation plots, an increased water deficit in the palm as a result of soil-moisture deficiency, in comparison with slight water deficits in adequately irrigated palms, invariably reduced the percentage of fruits that developed checking, provided the increase in water deficit occurred during the period of fruit susceptibility to checking.

1607. Griswold, H. B. 634.653
The Hass avocado.
Yearb. Calif. Avocado Soc. for 1945, pp. 27-31.
This newish variety has now been put on the Calavo list and details of its growth are given here.

1608. Hodgson, R. W. 634.653-1.521
Suggestive evidence of the existence of strains in the Fuerte avocado variety.
Yearb. Calif. Avocado Soc. for 1945, pp. 24-6.
Trials undertaken at the Division of Horticulture of the University of California strongly indicate the existence of at least two strains of the Fuerte avocado. One of them bears more consistently than the other in coastal localities and is found to be more resistant to unfavourable temperature conditions during blossoming and fruit setting. Careful choice of propagating material under coastal conditions should therefore be made.

1609. Cott, J. E. 634.653-1.5
High quality avocado nursery trees.
Yearb. Calif. Avocado Soc. for 1945, pp. 48-52.
Selected Mexican should be used as rootstocks. Nursery trees should be grown on good deep, well-drained medium loam type soils. Buds should be taken from healthy trees. Two and a half to three years in the nursery are required. Grading should be by caliper or diameter an inch above the bud union and should be between $\frac{1}{2}$ and 1 inch caliper. A day or two before digging Fuerte tips should be cut back to a point just above a group of dormant buds on the main stem and part of the leaves should be removed. Trees should be dug when dormant or between growth flushes. The roots should be carefully balled before the tree is moved, and if possible the balled trees should be kept under shelter from the sun for 10 to 20 days before planting out in full sunlight. They should be delicately handled throughout and not just swung about by the trunk.

1610. Argles, G. K., and Topper, B. F. 634.653(72.92)
Progress report on the planting of imported avocado pear varieties in Jamaica.
Yearb. Calif. Avocado Soc. for 1945, pp. 83-6.
In 1935 avocado pear varieties were imported into Jamaica from Florida and Guatemala. In 1939 budwood from these imported stocks was used by Argles to plant up 36

orchards on a number of soil types in Jamaica. Details are given here of the budding technique used. Conclusions reached so far are that, although the introductions have served to extend the pear crop to March and April with Collinson, Collinred and Winslowson and have improved on certain local varieties, they have failed in their original introductory aim, namely to provide satisfactory varieties for export under cold storage conditions. Only the Fuerte is available for that as yet.

1611. PARKER, E. R., AND LAURANCE, B. M. 634.653-2.19
Decline of avocado trees as related to the theory of boron deficiency.
Yearb. Calif. Avocado Soc. for 1945, pp. 91-2, bibl. 8.
Evidence examined in San Diego County fails to show a relationship between boron deficiency and avocado decline in that district.

1612. JOHNSON, E. 634.653-2.954
Weed control in avocado orchards.
Yearb. Calif. Avocado Soc. for 1945, pp. 71-4.
As a result of the common practice of cultivating little or not at all in avocado orchards, weeds which like such conditions become most rampant. Fuel oil is effect against weeds and not dangerous to avocados. It however, not so good against such weeds as morning glo which reproduce from underground stems. Here un certain conditions arsenicals, sodium chlorate and cart bisulphide may be useful. Recently 2,4-dichloropheno acetic acid (¼ lb. in 100 gal. water) has proved highly to to morning glory, but until its effect on avocado trees also known, its use cannot be recommended.

1613. FULLMER, F. S. 634.653-1.8
a **Variations in the phosphorus and potassium content of the foliage from Fuerte avocado groves.**
Yearb. Calif. Avocado Soc. for 1945, pp. 93-101.

b HAAS, A. R. C. 634.653-1.8
Nitrogen, potassium and phosphorus content of Fuerte avocado fruits from different orchards.
Yearb. Calif. Avocado Soc. for 1945, pp. 101-4.

c LAMMERTS, W. E. 634.653-1.523
The avocado breeding project [at Los Angeles].
Yearb. Calif. Avocado Soc. for 1945, pp. 74-80.
Includes notes on successful hot water treatment against *Phytophthora cinnamomi*.

TROPICAL CROPS.

1614. WELLENSIEK, S. J. 551.566.1: 631.521
De selectie der tropische gewassen. **(The selection of tropical crops.)** [English summary 1 p.]
Overdr. Landbouwk. Tijdschr., 1941, **53**: 240-53.
The author discusses the normal process adopted in breeding tropical crops, namely choice of varieties, increasing the variability by crossing (choice of parents by yield analyses, floral biology and technique of crossing, artificial mutations), the selection proper (judgment by eye, yield determination and field plot technique, quality, certainty of yield) and the fixing of the material selected in clones or seedling families. Next he divides the crops according to 5 schemes of selection which are illustrated and discussed. This subdivision, which comprises all crops, is as follows:—A. *Perennial crops* (including vegetatively propagated annuals): 1. Vegetatively propagated as a rule (sugar cane, cassava, pepper, agave, derris, *Amorphophallus*). 2. Sexually propagated as a rule, but vegetative propagation possible (cacao, kapok, cinchona, coffee, rubber, tea, possibly tung oil and teak). 3. Sexually propagated always (coconut, oilpalm). B. *Annual crops*: 1. Self-fertilized (rice, tobacco, groundnut, soybean). 2. Cross-fertilized as a rule but may be self-fertilized. 3. Exclusively cross-fertilized (maize). (*a*) Vegetative propagation impossible, (*b*) temporary vegetative propagation possible as a breeding method. [From author's summary.]

1615. ZANZIBAR PROTECTORATE. 63(67.81)
Programme of social and economic development in the Zanzibar Protectorate for the ten-year period, 1946 to 1955.
Sessional Pap. legisl. Coun. Protect. Zanzibar **1**, 1946, pp. 55.
The development of the following horticultural and plantation crops is discussed: Vegetables, cassava, fruit, tobacco, cacao, coffee, oil palm, cashew nuts, papaws and papain, derris, birds-eye chillies, cloves and copra. Clove research will be concentrated on cropping, diseases and reproduction.

1616. SABET, Y. S. 631.847
Bacterial root nodules in the *Zygophyllaceae*.
Nature, 1946, **157**: 656-7.
The following non-leguminous Egyptian desert plants were shown to possess root nodules containing nitrogen-fixing bacteria: *Zygophyllum* (four species), *Fagonia arabica* and *Tribulus alatus*. The plants depend on the nitrogen suppl by the bacteria.—Fouad I University, Cairo.

1617. CALLAN, E. McC. 632.96
Establishment of beneficial insects in Trinidad, B.W.I.
Nature, 1946, **157**: 555-6, bibl. 6.
This short note describes the introduction and establishm into Trinidad of *Dasyscapus parvipennis* Gahan, a min parasitic wasp which attacks various species of thri including the cacao thrips, *Selenothrips rubrocinctus* (Gia and of *Ploesius javanus*, a beetle predaceous on the bana weevil borer, *Cosmopolites sordidus* Germar.

1618. GEHLSEN, C. A. 633.523
Jute.
Mon. Bull. agric. Sci. Pract. Rome, 1943, **34**: 347T-71T, bibl. 15.
A comprehensive article on jute, its origin, cultivati uses, substitutes, trade, and scientific research into structure and value of its fibres.

1619. GUPTA, J. C. S., AND SEN, N. K. 633.523: 612.014.44
Photoperiodism in jute.
Nature, 1946, **157**: 655-6.
Photoperiodic treatment was given to varieties of the 2 species, *Corchorus capsularis* and *C. olitorius*. Both spe were found to be short-day plants, the critical light pe being about 12½ hours. The photoperiodic effect is inherited. While earliness of flowering due to ph periodic treatment is a drawback in fibre production— plants remain dwarf and bushy—it is of great advanta seed production and in breeding experiments.—Presid College, Calcutta.

1620. REYES CAJAS, I. 633.526.1
Abacá. **(Manila hemp.)**
Rev. Inst. Def. Café Costa Rica, 1945, **15**: 161-73, 235-45, bibl. 8.
A general description of the plant (*Musa textilis*) and c fibre is given and the history of its distribution for cul tion. The varieties cultivated in Costa Rica and cultural methods are described. Its diseases are br referred to.

21. WELLENSIEK, S. J. 633.72: 575.1
Genetical observations with the tea-plant.
Reprinted from *Genetica*, 1940, XXII: 4-5: 435-52, bibl. 15.
The genetical problem in tea comprises the demonstration ether certain characteristics are inheritable. (2) Vegeta- e reproduction by bud-grafting after Forkert's modified thod with slight alterations gives satisfactory results for ietical work. (3) Rapidity of growth and potential yield stocks, both of which are genetically determined, influence growth of scions. (4) It was experimentally demon- ated that genotypically low yielders react more strongly environmental changes and are more easily modified n genotypically high yielders. This result is offered as a rking hypothesis for quantitative characters in general. Several experimental results indicate the occurrence of ietical differences in rapidity of growth at an early age, ated to differences in yield. (6) Fast or average growth a late: age also are genetical yield factors. Slow growth a later age, however, is a chance characteristic. [From thor's summary.]—Proefstation West Java, Buitenzorg.

22. NORTH-COOMBES, A. 633.72(698.2)
Tea in Mauritius 1817-1944.
Rev. agric. Maurice, 1944, **23**: 228-38, bibl. 6.
account of the ups and downs of the small Mauritius industry, which owes its inauguration to the first English overnor of the Island. The survey of the country made in 30 by an expert from the Anglo-Ceylon and General tates Company may perhaps be described as the most nificant event of the industry's history. According to n about 100,000 acres, at present mostly scrub, would be table for tea. In 1943, the area planted to tea, despite considerable expansion in recent years, was still less than 00 acres. A further limited expansion would be desirable supply a growing home market. Mauritius, not being ignatory to the International Tea Agreement, will not be a position to export tea.

23. TBILISI INSTITUTE OF TEA AND SUB-TROPICALS. 633.72+633.85
Technology and biochemistry of tea and tung tree (*Aleurites fordii*). [Russian.]
All-Union Research Institute of Tea and Sub-tropical Crops, Tbilisi, 1941, Vol. 1, pp. 237.
is volume is a symposium containing 12 papers on hnology and biochemistry of tea and 2 on those of tung These articles embody the results of research at the ove Institute during 1937-39. Both crops are of con- derable importance in the economy of the Georgian S.S.R. d the U.S.S.R. In 1939 the trust "Cai-Gruzija" oduced 12,300 metric tons of tea and during the same year ere were 15,000 hectares under *Aleurites fordii*, which had stly reached the fruit-bearing stage.

24. SEMLER, H. 633.73
El Cafe VII and VIII. **(Coffee.)**
Rev. Inst. Def. Café Costa Rica, 1946, **16**: 288-95, 358-66.
ction VII deals with planting, distance between plants, paration of the holes for planting, transplanting, and tion VIII with cultivation, removal of weeds, pruning, eases, control of rust, soil fertility and manures.

25. FERMI, L. M. 633.73-1.535
La pega o arraigamiento de estacas de madera tierna del *Coffea arábica*. **(Rooting soft wood cuttings of coffee.)**
Rev. Inst. Def. Café Costa Rica, 1946, **16**: 263-72.
method of rooting coffee cuttings is described. The tings are obtained by bending branches and fastening m down to the ground; this induces the vertical growth shoots from latent buds. These shoots are used for tings, normally 4 to 9 inches long, with healthy leaves d short internodes on a cylindrical axis. The cuttings are planted in boxes (described) with glass covers; good drainage is essential. The soil recommended is peat moss (2 parts) and coarse sand (1 part). The leaves of the cuttings are each cut back by about one-third in order to reduce transpiration. The temperature and humidity must be well regulated.

1626. TANADA, T. 633.73-1.84: 581.035
Utilization of nitrates by the coffee plant under different sunlight intensities.
J. agric. Res., 1946, **72**: 245-58, bibl. 40.
Under the conditions of the experiment (water culture), coffee plants grew better without shade than with heavy shade. Increases in shading resulted in increases in total nitrogen and in decreases in dry matter. Potassium and calcium tended to increase with shading. During the cooler period, phosphorus also tended to increase with shading. Severe potassium deficiency resulted in abnormal increases in total nitrogen. It is concluded that under suitable nutritional conditions, the accumulation of nitrates in the leaves of the coffee plant is a normal process, and that the amount stored at a certain period is determined largely by the amount of solar energy available to the plant at that time. If the supply of nitrate nitrogen is larger than the demand, the excess is stored by the plant.

1627. RUEST, C. 633.73-2.3/7
Enfermedades del cafeto. **(Diseases of coffee.)**
Rev. Inst. Def. Café Costa Rica, 1946, **16**: 341-3.
Descriptions are given of the damage caused by (1) the coffee berry borer (*Stephanoderes hampei*) and of (2) the "mancha de hierro" disease of leaves and fruit caused by the fungus *Omphalia flavida*.

1628. LEPESME, P. 633.73-2.754
Contribution à l'étude de *Volumnus obscurus* Popp. (*Hemiptera capsidae*), agent de la "coulure" des fleurs de caféier en Afrique Centrale. **(A study of *Volumnus obscurus*, the cause of flower abortion of coffee in central Africa.)**
Ann. Épiphyt., 1942, **8**: 47-59.
The "running off" or abortion of coffee flowers at Libonga (Gabon), where most of these observations were made, is caused by the repeated punctures of the capsid bug, *Volumnus obscurus*, in the adult or the larval state. The morphology, distribution, biology and habits of the insect are described. Two forms of running off are recognized. One is a result of lack of fertilization of the pistil, the other of the non-development of the fertilized ovary. The former is the more frequent at Libonga and results from the capsid's punctures, but it is not necessarily due to abortion of the stamens, and is not typical of the process described by Belgian workers on *Coffea arabica* as damage characteristic of *Lygus*. In typical cases the petals turn black, separate from the disc with or without the stamens, and remain attached, in the form of a cone, to the style which continues to grow. In others the blackening of the perianth is not accompanied by an elongation of the style. Sometimes only the ovary blackens. Control measures recommended involve the destruction of wild plants that serve as alternate hosts, and the application of pyrethrum powder.

1629. NOTLEY, F. B. 633.73-2.73
Algunas observaciones sobre los thrips del cafeto. **(Coffee thrips.)**
Rev. Inst. Def. Café Costa Rica, 1945, **15**: 296-302.
Previously the author described work on coffee thrips in Kenya (*H.A.*, 6: 378), and he continues in the present article with observations in the provinces of N. Tanganyika on the thrips present there, *Physothrips xanthoceros* Hood (see also *H.A.*, 10: 1183). He emphasizes the relation between temperature and incidence of thrips with the object of prognosticating attacks of the pest so that control measures can be timed effectively.

1630. VAYSSIÈRE, P. 633.73-2.754
La punaise du caféier (*Antestia lineaticollis* Stal.) au Cameroun. **(The *Antestia* bug on coffee in the Cameroons.)**
C.R. Acad. Agric. Fr., 1946, **32**: 156-7.
Antestia infestation of coffee in the Cameroons has increased in recent years. Its rapid multiplication began probably in 1943 on *Coffea arabica*; in that year the trees blossomed freely but the crop was slight, and the yield progressively decreased until 1945. The pest punctures all the aerial organs of the tree. The generations overlap but the insects are most numerous in June; they come in waves and attack first the flowers, then the fruit, the ripe berries and the branches. At present only *C. arabica* is infested, *C. robusta* in particular being avoided. Reference is made to successful control trials by Thélu [see next abstract].

1631. THÉLU, —. 633.73-2.754
Utilisation du D.D.T. dans la lutte contre les punaises (*Antestia lineaticollis* Stal.) du caféir au Cameroun. **(The use of D.D.T. against *Antestia* of coffee in the Cameroons.)**
C.R. Acad. Agric. Fr., 1946, **32**: 157-8.
Experiments for the control of coffee *Antestia* are described, using two American DDT preparations, one 35% in xylol, the other a dust containing 25% DDT, both mixed with water. Results are given in terms of the pure DDT per 1,000 litres of water. Good control was obtained with 500 g. and upwards.

1632. HAMBLETON, E. J. 632.796
El exterminio de la hormiga agricultora o parasol. **(The destruction of parasol ants.)**
Rev. Inst. Def. Café Costa Rica, 1945, **15**: 542-9.
Methods of destroying the nests of the parasol ants (*Atta* spp.) are described under (1) the use of poisonous gases, (2) flooding the nests, (3) destruction of the nests by hand. The poisonous gases recommended are carbon disulphide and that resulting from the combustion of a mixture of sulphur (3 or 4 parts) and arsenic oxide (1 part).

1633. BURKART, A. 633.73
Dos leguminosas cuyas semillas se usan como substitutos del café en la Argentina. **(Two leguminous plants whose seeds are used as substitutes for coffee in Argentine.)**
Rev. argent. Agron., 1946, **13**: 36-46, bibl. 23.
Describes, with illustration, *Acacia feddeana* Harms and *Cassia occidentalis* L. A review of published work on the latter in relation to the use of its seeds as a substitute for coffee is appended.

1634. FERRAND, —. 633.85: 575.1
Découvertes récentes dans le génétique du palmier à huile (*Elaeis guineensis*) et leurs conséquences quant à la sélection de ce végétal. **(Recent genetical discoveries in the oil palm and their effect on the selection of this plant.)**
C.R. Acad. Agric. Fr., 1946, **32**: 76-9.
The *Elaeis* types *dura*, *macrocarya*, *pisifera*, and *tenera* are briefly distinguished and their hybridization is discussed. The type of *tenera* is an unstable hybrid of *dura*×*pisifera* and when selfed gives generally 25% *pisifera*, 50% *tenera* and 25% *dura*. The cross *tenera*×*dura* eliminates *pisifera*, which is recessive, and the progeny is about 50% *dura* and 50% *tenera*. The implications of such results are mentioned and further study in this direction is deemed necessary.

1635. PIEDRAHITA, F. 633.88
Monografia de la Belladona. **(Monograph on belladonna.)**
Rev. Inst. Def. Café Costa Rica, 1946, **16**: 352-7, bibl. 12.
This article summarizes information culled from various sources on the deadly nightshade, *Atropa belladonna* L., under (1) ecology, (2) its special character, (3) morphology, (4) habitat, (5) properties and constituents of the pl (6) its physiologic toxic action, (7) symptoms of poison and antidotes, (8) its physiologic therapeutic action, (9) uses and commercial aspects.

1636. RANGASWAMI, S. 633.88
Occurrence of kanugin in the stem bark of *Pongamia glabra*.
Curr. Sci., 1946, **15**: 127-8, bibl. 4.
Extracts from air-dried stem bark of the Poonga oil pl yielded a crystalline substance which proved to be kangu (used in Indian medicine), a substance previously obtai from the roots of the same plant. The yield from stem bark is only about one-tenth of the yield from root bark.

1637. EFIMENKO, O. M., AND JAKIMOV, P. A. 633.88.51: 581.192
A biochemical study of the leaves of *Cinchona*. [Russian.]
Vest. Soc. Rast. (*Soviet Plant Industry Record*), 1940, No. 5, pp. 149-64.
C. succirubra is the species dealt with in this article, for i the only one which can be grown in the U.S.S.R., a utilized as young rooted cuttings, from the leaves of wh (and, if necessary, from the whole plant, including the roo quinine and other alkaloids can be extracted. The lea of the young plants grown from cuttings form 50% to 7 of the green foliage, and contain not only quinine but a other compounds present in sufficiently large amount to worth extracting. The biochemical processes, therefo by means of which all these compounds are formed, and methods which can be employed to encourage these proces to produce the largest possible amounts of the compour are the particular concern of the present article. They o problems which differ from those involved in the exploitat of the bark of the mature *Cinchona* tree. The mature lea contain the following compounds, the amounts be expressed as percentages of dry matter: alkaloids 0 total nitrogen 2·82, protein nitrogen 2·2, alkaloid nitro 0·2, reducing sugars 1·62, pectins 7·43, hemicellulose 7· cellulose 9·7, citric acid 4·5, other acids 3·0, resins 4·5, ash 13·4. The content of alkaloids is between 1·25% in upper leaves which, though mature, are still young, and in the old, lower leaves. The upper leaves contain also largest amounts of carbohydrates, but the middle lea contain most starch. On the other hand, the content citric and oxalic acids increases from the upper to the lo leaves. The maximal quantity of citric acid is reache September, that of oxalic acid in July. Increases decreases in total and protein nitrogen are accompanied corresponding increases and decreases in the conten alkaloids. Shading of the plants increased the conten alkaloids in the leaves, stems and roots. The maxim was reached under three layers of gauze, and correspor to the maximal amount of dry matter in the plant. Am the manures tried, KNO_3 and KH_2PO_4 were among most effective, increasing the content of alkaloids in leaves, stems and roots. Since the leaves are to be the r source of alkaloids, most of which are contained in younger leaves, the chief aim of the cultivator must b stimulate the growth of leaves and maintain as lar proportion as possible of young leaves. This aim, accor to the experiments described, can be attained by cuttin the terminal buds, and removing the leaves as the amou alkaloids in them reaches the maximum. This stimu the growth of new leaves, and also increases the conte alkaloids per leaf. The plants need not therefore exhausted by indiscriminate cutting of the leaves.

1638. NORTH-COOMBES, A. 634.571-1.534.4
La propagation du letchi. **(A method of propagating the litchi.)**
Rev. agric. Maurice, 1944, **23**: 244-5.
The method described is that of marcotting and prac

hints are given for avoiding drying out, invasion by millipedes, etc. Normally severance from the parent starts 3 months after the initial operation and is done in 3 stages at intervals of a fortnight. Another month is usually necessary before the new plant can be planted out and left to its own device.

1639. GUADAGNIN, L. 634.771
A bananeira. **(The banana.)**
Ceres, 1945, **6**: 316-26.
This is a general description of the banana and its cultivation, discussed under history, varieties (brief description of the principal varieties cultivated), culture, soil, climate, preparation of virgin ground for a banana plantation, pruning, gathering the crop, the banana trade, banana flour, banana figs, banana alcohol.

1640. VENKATARAMANI, K. S. 634.771
"Kaio" an imported banana variety.
Curr. Sci., 1946, **15**: 110.
Kaio, a Hawaiian variety of banana, has been introduced into South India and is being grown in the Banana Experimental Area of the Agricultural Research Institute, Coimbatore. A description of its growth there is given. The fruit is about 6½ inches long, oblong to spindle shaped, taste and flavour as in "Neudran", the Malabar banana.

1641. DODDS, K. S. 634.771
***Musa fehi*, the indigenous banana of Fiji.**
Nature, 1946, **157**: 729-30, bibl. 6.
During a visit to Viti Levu, Fiji, the author examined the indigenous edible banana known as Soaqa and identified it as *Musa fehi*. The plant is a sterile diploid belonging to the sub-group of the genus with $x=10$.

1642. MEREDITH, C. H. 634.771-2.3
Soil actinomycetes in relation to Panama disease of banana.
Abstract in *Phytopathology*, 1946, **36**: 406.
Strains of *Actinomyces* antagonistic to *Fusarium oxysporum cubense* in the laboratory were applied near the stools of banana at planting time in a field infested with the parasite. At 5 months after treatment the treated plants were larger than check plants. At 12 months there were no significant differences in the Panama disease in the plots.

1643. CHOWDHURY, S. 634.774-2.4
***Ceratostomella* diseases of pineapple.**
Ind. J. agric. Sci., 1945, **15**: 135-9, bibl. 11.
Three diseases of pineapple, leaf-spot, base-rot, and fruit rot, are caused by *Ceratostomella paradoxa* in the Surma Valley and the Hill Districts, Assam. The symptoms are described. It was found that the fungus could not infect unwounded leaves, but both ripe and green fruits were equally susceptible to infection without wounding.

1644. CHOWDHURY, S. 634.774-2.4
Heart or stem-rot of pineapple.
Ind. J. agric. Sci., 1945, **15**: 139-41.
Heart or stem-rot, a serious disease of pineapple in Assam, is described. This disease, caused by *Phytophthora parasitica* Dastur, can be controlled by good drainage, not planting weak material, and by dipping in a strong bordeaux mixture (1 lb. copper sulphate, 1 lb. hydrated lime, 3 gal. water) before planting.

1645. FENNELL, J. 634.8: 551.566.1
La uva tropical. **(Grapes in the tropics.)**
Rev. Inst. Def. Café Costa Rica, 1945, **15**: 370-82.
Failure to cultivate the grapevine successfully in the tropics in the past has been a result of attempting to grow varieties unsuitable for such climates. The author describes his search for suitable species in the south of Florida, and his hybridization experiments. Some 100,000 seeds were sown, thousands of seedlings have been planted out and some hundreds of plants have already fruited. The work has not proceeded far enough for these new varieties to be distributed, but it is believed that such varieties will be more adaptable to tropical conditions than those raised from species of temperate regions.

1646. DODDS, K. S., AND PITTENDRIGH, C. S.
a 634.771: 576.312.3
Genetical and cytological studies of *Musa*. VII. Certain aspects of polyploidy.
J. Genet., 1946, **47**: 162-77, bibl. 7.

STORAGE.

1647. PHILLIPS, W. R. 664.85.11
Storage of apples.
Publ. Dep. Agric. Canada **776**, 1946, pp. 35, being *Fmrs' Bull.* **132.**
The technique of apple cold storage, in a controlled atmosphere and otherwise, and the necessary equipment are discussed in detail. Valuable recommendations are made as to optimum atmospheres and temperatures for individual varieties. The reservation is made that the requirements of varieties like McIntosh, Golden Russet and Cox's Orange have been much more fully explored than those of other varieties and that therefore information relating to the latter must be regarded as of a preliminary character. Generally, the storing of different varieties in the same chamber is discouraged. At Ottawa, however, no deleterious effect was experienced in trials as a result of storing McIntosh, Fameuse and Golden Russet together. In fact, the flavour of Golden Russet seemed to be improved. The bulletin concludes with notes on 20 varieties including particulars on storage life, on optimum temperature and relative humidity conditions and on the storage troubles to which each variety is especially susceptible, and their possible control.

1648. SMOCK, R. M., AND SOUTHWICK, F. W.
664.85.11: 632.19
Studies on storage scald of apples.
Bull. Cornell agric. Exp. Stat. **813**, 1945, pp. 39, bibl. 28.
Although the authors covered only certain phases of the problems of apple scald control in their study, they give a summary of all the investigational work on scald. The main objects of their own experiments were to find a means of control more satisfactory than oiled paper and to determine something of the nature of the volatiles responsible for scald. The following extract from the authors' summary records their chief results: (1) Shading limbs of Rhode Island Greening and McIntosh trees with cheesecloth during the growing season usually, but not always, reduced the amount of scald in storage. (2) Shading individual fruits of these two varieties with white paper seemed to increase scald. (3) Defoliation early in the growing season seemed to result in reduced scald in many instances. (4) A study of the production of total volatile materials and incidence of scald during a three-year period showed a good correlation, i.e. when volatile production of McIntosh apples was relatively high, scald severity seemed to be greater. More study is needed on this point. (5) One wax emulsion [489 AM] that was tested gave promising results in scald reduction. On the later-picked fruit it gave as good scald control as did oiled paper. Use of such a wax has some advantages over the use of oiled paper. Limited commercial trials with this material are recommended. (6) Coating the fruit with a commercial grade of mineral oil gave inconsistent results. (7) Observation revealed that scald was worse when there was free water in the experimental chambers. On the other hand, badly shrivelled fruits usually do not scald badly. (8) The vapours of McIntosh apples seemed

to increase the amount and severity of scald on Cortland and Greening apples. The vapours of ripe Greening fruits had some effect on less mature fruits in storage, but the effect was not so striking as with McIntosh. This does not mean, however, that these varieties will not scald when stored alone. (9) A number of air-conditioning agents were tested as to their ability to remove scald gases in storage. The most promising one was activated carbon to which had been added bromine. Limited trials on a commercial scale seem to be justified to test the value of this air-conditioning treatment.

1649. FISCHER, H. 664.85.13: 632.4
Eine seltene Fäulnis bei Birnen. **(An unusual rot of pears.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 223-5.
A rare form of *Cladosporium herbarum* rot of stored pears is described and illustrated. The flesh of affected fruits turns black, but no external symptoms are visible.—Wädenswil Research Station.

1650. GERHARDT, F., AND SMITH, E. 634.11: 664.85.11
Physiology and dessert quality of Delicious apples as influenced by handling, storage, and simulated marketing practice.
Proc. Wash. St. hort. Ass. 41st ann. Meet., 1945, pp. 151-71, bibl. 10.
Ten boxes of packed Delicious apples from each of two orchards were subjected to five handling, storage and marketing treatments, and changes in the fruit as a result of its handling history were measured biochemically and organoleptically. The respiration in storage was considerably less at 31° than at 36° F. The dessert quality was higher and deleterious changes in chemical composition were less when they were "shipped" at temperatures of 31° than at 45° F. Biochemical analysis proved to be a more sensitive means of detecting the early stages of senescent changes in dessert quality than did organoleptic tests. Differences in dessert quality due to transit temperatures of 31° and 45° F. were significant in early shipments. Hill-grown fruit retained its firmness, soluble solids, acidity, soluble pectin, and respiratory activity longer than did fruit grown at a lower elevation. The ripened fruit that received most favourable handling had acceptable dessert quality in April, whereas that with the least favourable handling became mealy in texture and stale in flavour by December. The need for prompt and adequate refrigeration, the more general use of thermostatic heaters in refrigerator cars and refrigerated display during retail marketing, and the importance of condition of the fruit as a factor of grade are mentioned in relation to improving the storage life and dessert quality of the Delicious apple. [From authors' summary.]

1651. BRASHER, E. P., AND OTHERS. 664.84 + 664.85
The preservation of freshness in vegetables and fruits from harvest to consumption.
Fruit Prod. J., 1946, **25**: 168-70.
This study deals with the effects of various storage conditions on the ascorbic acid (vitamin C) and soluble solids content, weight, appearance, and palatability of fresh vegetables and fruits in the interval from harvest to consumption. Sweet corn, tomatoes, kale, shelled green lima beans, cantaloupes and peaches were used. With all of these the appearance and palatability remained fairly constant for four days when stored in direct contact with cracked or snow ice. With tomatoes and peaches refrigeration seemed slightly superior to that of snow ice for retaining appearance. When stored at room temperature lima beans were unfit for human consumption after one day; sweet corn, kale, and cantaloupes, two days; tomatoes, four days. The results indicate that the use of cracked ice or ice refrigeration in marketing these fruit and vegetables reduces losses due to shrinkage and spoilage, and enhances the retention of ascorbic acid, freshness and palatability. The results with kale suggest that the use of cracked ice in the marketing of leafy vegetables offers definite advantages.

1652. PENTZER, W. T. 664.84.036.5
Handling, transportation, and storage of fresh vegetables for canning.
Fruit Prod. J., 1946, **25**: 268-9, 281.
Of the many vegetables canned in California, spinach, peas, beans, corn and asparagus are extremely perishable; only slightly less so are cucumbers, peppers and cauliflower, while potatoes, carrots and cabbage are relatively long lived. The following points are discussed: how vegetables deteriorate (by moulds and bacteria); preventing deterioration; refrigerated trucks; rail shipments; storage.

1653. BRISON, F. R. 634.521-1.563
The storage of shelled pecans.
Bull. Tex. agric. Exp. Stat. **667**, 1945, pp. 16, bibl. 7.
Ten years' tests with pecans showed: (1) The development of rancidity is the most important change that influences the flavour of pecans. (2) Rancidity can be retarded and largely prevented for a period of at least 11 months by storing the shelled kernels at a temperature of 32° F. or lower. Kernels stored at 5° F. were perfectly good, edible and marketable throughout a period of 2 years. (3) Kernels remain good and edible for at least a month after being removed from storage. It is believed that kernels do not become rancid more rapidly after being removed from storage than fresh pecans would under the same conditions. (4) Shelled pecans should be stored soon after harvest, while they are fresh, and before time has elapsed to permit initiation of chemical changes which causes rancidity. (5) Pecan kernels that were sealed while hot in cans or jars, and stored at average room temperature were better than kernels which had been sealed without heating, but definitely not so good as fresh pecans, or those that had been stored in sealed cans or moisture-proof cellophane at low temperature. (6) Kernels that lose moisture measurably below that of normally cured kernels become unmistakably strong and rancid. Kernels that increase in moisture percentage above that of normally cured kernels do not become rancid readily even at a relatively high storage temperature, but the texture becomes poorer. (7) Rancidity causes kernels to become progressively darker. (8) Fumes of ammonia cause the outer covering of kernels to turn black. (9) Larvae of the Indian meal moth are likely to infest pecan kernels. This damage can be avoided by protecting the kernels from moths by proper packaging and by holding the kernels at a low temperature. (10) Blue mould is likely to develop on pecan kernels if their moisture percentage rises under very humid storage conditions to 4·76. [From author's conclusions.]

1654. CANADIAN COMMITTEE ON FOOD PRESERVATION. 664.8 + 656(71)
Collected papers (Vol. 1, papers 1-54) ***on Storage and Transport of Food and*** (Vol. 2, papers 55—108 + 2 appendices) ***on Food Preservation.***
Vol. **1**, 1938-1942; Vol. **2**, 1940-1944.
This Canadian committee grew out of a conference on cold storage held at Ottawa in June 1934 and was first called the Canadian Committee on Storage and Transport of Food. Its present name was assumed later. The Committee is sponsored by the National Research Council of Canada, the Dominion Department of Agriculture and the Fisheries Research Board of Canada. It is noted in the foreword to the first volume of these papers that the Committee also has the co-operation of the Ontario Agricultural College, where a joint programme of studies on fruit and vegetable storage, designed to utilize the joint facilities of that institution, the University of Toronto and the Horticultural Experiment Station at Vineland, is under way. The majority of the papers, usefully here collected, concern meat or fish products, but there are nearly a dozen which concern vegetable or

uit preservation. All these are reprinted from such ournals as the *Canadian Journal of Research, Scientific griculture*, and have already been noted or abstracted in *lorticultural Abstracts*, Vol. 8 and onwards.
n addition papers are included on the purely technical side f refrigeration and refrigerated transport. Finally in two appendices appear two booklets of a more popular nature entitled (1) Dehydration of vegetables in Canada, being No. 3 of a series of booklets reprinting articles from *Food in Canada*, and (2) More about Canadian dehydration methods, being No. 5 of the same series [see *H.A.*, 1670, 1671].

PROCESSING AND PLANT PRODUCTS.

655. Fruit and Vegetables Products Research Committee, Department of Agriculture, Canada. 664.85+664.84(71)
Annual Report 1945.
Consists of 8 reports as noted below.

(i) Central Experimental Farm, Ottawa, Fruit Products Laboratory (MacArthur, M.).
Report of the Fruit and Vegetable Products Laboratory, Division of Horticulture 1944, pp. 28.
Work on dehydration experiments with the following crops is described:—cabbage, potatoes, carrots, turnips, peas, green beans, beets and blueberries. Since 1941, when Canada stepped up her dehydrated vegetable output to supply the U.K., the quality of dehydrated products has improved greatly.

(ii) Summerland (Atkinson, F. E., and Strachan, C. C.).
Summarized report for 1943-44 of the Fruit and Vegetable Products Laboratory, Dominion Experimental Station, Summerland, pp. 34.
Dehydration of fruits concerned particular varieties of apricots, peaches, pears and prunes. Dehydration of vegetables covered potatoes and beets. Comparison was made of the A.O.A.C. and the Nichol-Reed distillation methods of analysing SO_2 content. For moisture analysis satisfactory trials are reported on the Johnston distillation method for dehydrated vegetables. It is noted that an article on gas analysis trials was published in *Food Industries*, December 1944 number. The ascorbic acid content in canned tomato juices and tomatoes as affected by different factors was investigated. Work is also reported on apple juice with special reference to ascorbic acid content, on apple syrup and on the nutritive value of British Columbia fruits.

(iii) Summerland (Atkinson, F. E., and Strachan, C. C.).
Annual Report for 1945 of the Fruit and Vegetable Products Laboratory, Dominion Experimental Station, Summerland, pp. 42.
Work is reported on the following subjects. Many of them, though primarily of immediate practical interest to Canadians and necessarily briefly reported, are of interest to all workers in the same field. They include: Plant development for tomato juice manufacture, for apple juice concentration and for stone fruit and pear canning. Harvesting and storing peaches, pears and Italian prunes for canning. Ascorbic acid content of tomatoes and its retention on processing. Ascorbic acid content of grapes and cantaloupes. Colour grading of tomato juice with reference to ascorbic acid content. Factory methods for determining ascorbic acid in apple juice. Composition of B.C. fruits. Suitability of known varieties of the following fruits for frozen pack preservation:—peaches, apricots, prunes, pears, sweet cherries and cantaloupes.

(iv) Kentville (Hope, G. W.).
Annual Report of the Fruit and Vegetable Products Laboratory of Kentville Experimental Station (undated), pp. 2.
Investigations are reported on the production of bland apple syrup and on ester extraction.

(v) Division of Horticulture, Central Experiment Farm, Ottawa (Phillips, W. R.).
Low temperature investigations 1942-43 and 1943-45, pp. 22 and 31.
Work discussed in the first report covers:—*Storage of carrots and beets for seed and seed potatoes.* The beet results are of a preliminary nature. As regards carrots, large roots protected with damp sphagnum moss and stored at 36° to 32° F. give best results for carrot stecklings. A temperature of 36° F. appears to be satisfactory for seed potato storage. *Fruit storage.* Pears tested were 4 hardy varieties grown at Ottawa. An interim report concerns the effect of various rootstocks on storage behaviour in apples. The McIntosh figures emphasize the danger of coming to conclusions on data from apples on young trees. A comparison of Fameuse on Anis with Fameuse on E.M. I shows definitely better storage results from the former. *Type of refrigeration for apple storage.* The evidence suggests the possibility of controlling moisture or weight loss by having sufficient cooling surface regardless of type of refrigeration. Circulating the air of the store appears to have an effect on quality retention by virtue of taints being absorbed in the brine spray. Although not so foolproof as the brine circulation system against refrigerant leaks in the storage room, the brine spray system as usually designed in commercial plants is safer than the ordinary direct expansion system in this respect. *Packaging.* The use of waxed liners in cartons as against cartons without such liners results in reduced moisture loss during storage and does not increase the incidence of rots.
The first twelve pages of the 1943-45 report concern *potato storage.* Field notes indicate that high moisture conditions at 36° F. are the best all round storage conditions for seed potatoes. Observations continue on the effect of rootstock on *apple storage.* So far—with young trees—Anis is most consistent in its effects. Data are tabulated on the effect of cultivation and fertilizer treatment on storage quality of apples from trees on known rootstocks. Gas storage trials on a semi-commercial scale with McIntosh showed (1) no CO_2 injury, (2) an increase in superficial scald, (3) complete control of core flush. Small-scale trials showed no increase in superficial scald and in other respects better results than ordinary cold storage. Trials of different types of refrigeration showed that the air circulation system will maintain a higher quality in McIntosh apples for a longer period than the direct expansion or the brine circulation systems of refrigeration. Acidity trends in McIntosh during storage were observed. The effect of rootstock on storage behaviour was also observed for Toshkee, Lawfam, Niobe, Linda, and that of cultural treatment on Linda and Lobo. Investigations also covered the storage qualities of some 13 varieties and the effect of air filters on storage rooms.
(vi) Summerland (Britten, J. E.).
Fruit harvesting and storage investigations. Summarized report for 1945 on Low Temperature Investigations, Summerland Experimental Station, pp. 5.
Notes are given on harvesting and storing of cherries, apricots, peaches, pears and tomatoes.

(vii) DIVISION OF CHEMISTRY, SCIENCE SERVICE (JANSON, J. T.).
Report of Food Investigation Section, Division of Chemistry for the year 1945, pp. 4.
Observations on the vitamin C content of Bonny Best tomatoes indicate that applications of N, P and K mixtures have no effect on vitamin C content.
(viii) DIVISION OF BACTERIOLOGY AND DAIRY RESEARCH, SCIENCE SERVICE (JONES, A. H., AND PIERCE, M. E.).
Report of the Division of Bacteriology and Dairy Research for the years 1944-45, pp. 20.
Work in co-operation with other Divisions on the microbiology of dehydrated vegetables and of certain canned products is reported.

1656. SCHLÖR, J. 664.85
Früchteverwertung im Ausland. **(Fruit utilization in European countries.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 213-9, 231-5.
A survey of the position prior to the outbreak of war, with particular reference to France, Germany and Austria.

1657. ZWEIFEL, H. 664.85(494)
Die Obstverwertung in der Schweiz, Rückschau und Ausblick. **(Fruit utilization in Switzerland, history and prospects.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 197-200.
Fruit utilization in Switzerland is highly organized and partly State-regulated. Just before the war a new administration began to encourage the production of unfermented fruit juices and fruit residues. The policy met with great success, especially during the war, when juice concentrates served as a substitute for sugar and the residues were used for feeding purposes. After the war, an outlet for the fruit juice production must be found in export. No difficulties are anticipated, since the Swiss climate favours the growing of quality fruit for juice manufacture. The article is an extract from a paper read at a meeting at Wädenswil in April 1946.

1658. SIDDAPPA, G. S., AND MUSTAFA, A. M. 664.85+664.84
Preparation and preservation of fruit and vegetable products.
Misc. Bull. imp. Coun. agric. Res. India **63,** 1946, pp. 24, bibl. 22, 1s.
Research work on canning and preservation of a large number of fruit and vegetables was carried out at Quetta, Baluchistan, during the period 1938-43, in the course of which methods for the processing of local products have been standardized. Results are briefly discussed here.

1659. SOMERS, I. I. 664.8.036.5
Safe practices in retort operation.
Fruit Prod. J., 1946, **25**: 210-2.
In processing food products, certain recommended operations must be followed if the safety of the canned foods is to be assured. The elimination of air from the retorts is one of the chief problems. The results of over 500 heat distribution tests led to the establishment of procedures for venting with horizontal and with vertical retorts. These are set out, and the factors influencing efficiency of venting procedures are described, e.g. types of baskets and trays, arrangement of cans in a basket, dividers used to separate cans of different lots, and baffle plates.

1660. STAMPA, G. 664.85.037+664.84.037
Conservation of fruits and vegetables by rapid freezing.
Mon. Bull. agric. Sci. Pract. Rome, 1944, **35**: 153T-163T, bibl. 41.
The author gives the essential points of an address given by Scurti at the Turin Academy of Agriculture in June 1942, in which he reviews work done on this new method of preserving fruit and vegetables in their natural state. He deals with the methods employed, namely slow and rapid freezing and a combination of the two, methods of storing the frozen products and the prevention of deterioration in them, vitamin losses during storage and prevention thereof, various technical devices used in the processing and the optimum combination of different processes likely to give maximum success. Briefly his conclusions are that the rapid freezing of fruit and vegetables is admirably suited to the purpose, especially if the combined (Pankofer) method is used. A combination of quick freezing with the best methods of sterilization will maintain all the organoleptic, nutritive and oligodynamic characteristics of the fresh products. To those wanting further information the references should prove useful.

1661. TRESSLER, D. K. 664.8.037
Recent advances in frozen food technology.
Fruit Prod. J., 1946, **25**: 228-9, 251.
In reviewing research work on food preservation by freezing the author asserts that "it will not be long before freezing will be the most important method of preserving perishable foods".

1662. NICHOLAS, J. E. 664.84/85.037
Research on frozen foods.
Proc. Pa St. hort. Ass. 87th annu. Meet. 1946, being *Pa St. hort. Ass. News*, 1946, **23**: 49-56.
APP, F.
Quick freezing as an aid to the marketing of produce.
Ibid., **23**: 114-21.
The author stresses the necessity for research into methods of preparation, the actual process of freezing, type of packs and methods of preparing for table. He notes that the speed at which fruits or vegetables reach the desired ultimate freezing temperature varies greatly according to how they are subjected to low temperature, i.e. whether packed, underlying unprotected or immersed in liquid. Each different kind of food will also need different treatment. The retention of the frozen state up to the time of its use also presents a problem. Given a solution to some of these questions, quick freezing is likely to give a product equal to that straight from the field and subject to far less waste.

1663. HUTCHINGS, B. L., AND EVERS, C. F. 664.8.037
Research and quality control of precooked frozen foods.
Fruit Prod. J., 1946, **25**: 171-4, 189, bibl. 4.
This article broadly outlines the problems connected with the preparation of precooked frozen foods. Points emphasized are that the foods to be processed should be initially of high quality, and that strict sanitation within the freezing plants should be observed. There should be a continuous check on bacterial counts. It is absolutely essential that the products should be handled as quickly and as aseptically as possible to forestall contamination during periods of cooking and packaging, since it is at these stages in production that there are optimum temperatures for more active bacterial growth.

1664. DIEHL, H. C. 664.85.037+664.84.037
Need of technological supervision in the selection, preparation and freezing of fruits and vegetables.
Fruit Prod. J., 1946, **25**: 272-9, 283, bibl. 45.
The basic factors affecting quality are: variety or type of raw product, its nutrition, composition and stage of maturity at harvest, and methods of retaining desirable constituents during harvesting, handling and transport from field to process line. These factors are discussed under: field handling of produce; the heat of respiration; varietal differences affecting quality; precooling; bacterial control. The co-operation of the engineer, inventor, food technologist, plant physiologist and manufacturer of equipment

ressed, and the institution of a quality control laboratory advocated. It is stated that, "to retain as nearly as ossible the various nutritive properties of frozen fruits nd vegetables—carbohydrates, proteins, fats, minerals, itamins—in proportions with which nature has endowed ie raw material, as well as to have palatability as a food in ie finished product is a job which calls for the intimate ombination of the sciences and engineering practice".

665. Powers, J. J., and Esselen, W. B., Jr. 664.85.11.037
The use of calcium salts in freezing McIntosh apples.
Fruit Prod. J., 1946, **25**: 200-2, 217, bibl. 4, being *Contr.* **587**, *Mass. agric. exp. Stat.*

alcium as a firming agent prevents canned, fresh, and frozen iced McIntosh apples from becoming excessively soft or ushy when baked in a pie, the amount used and length of eatment depending upon such factors as the original rmness of the apples, the length of time they have been in ore, the degree of firmness desired, etc. Such treatments ave been found to be just as effective with so-called "green IcIntosh" apples as with ordinary McIntosh apples.

666. Fieger, E. A., Dubois, C. W., and Kalogereas, S. 664.85.75.037
Freezing experiments on strawberries.
Fruit Prod. J., 1946, **25**: 297-301.

xperiments on freezing strawberries with various amounts f dry sugar and sugar syrup were conducted in connexion ith various treatments of the fruit and methods of freezing. hemical, physical and organoleptic examinations were ade on the samples after 16 to 19 months storage at 0° F. licing of strawberries facilitated absorption of sugar sulting in better retention of flavor during the storage eriod. The addition of dry sugar gave a much better oduct than use of sugar syrup. Addition of sugar has no ffect on retention of color of strawberries when frozen and ored at 0° F. Delayed freezing after addition of dry sugar sulted in a poorer product than those which were frozen mmediately after adding the sugar. The best proportions f sugar to strawberries by weight lay between 1: 4 and 1: 5 epending on the preference of the individual. [Authors' mmary.]

667. van Hiele, T. 664.85.75.037: 634.75
Rassenproef met aardbeien in verband met de geschiktheid voor snelvriezen. **(Strawberry variety tests in relation to suitability for quick freezing.)**
Meded. Direct. Tuinb., 1946, pp. 381-6.

he trials described show that the varieties Oberschlesien nd Jucunda yield good results, while Madame Moutot is nsuitable for quick freezing. Freezing the fruit with the ugs gives an inferior product. The addition of sugar efore freezing is necessary, and with whole fruit a sugar olution gives a better product than dry sugar The best igar solution is one of 35%; sometimes, depending on e sugar-concentration of the fruit, a low concentration, g. 30%, can be used. If dry sugar is used the proportion 1 part sugar to 3 parts fruit is recommended. The sugar ould be allowed to be absorbed by the fruit before freezing. rawberries cut up, for use later in ice-creams or beverages, e better mixed with dry sugar. The strawberries should ot be too large, they should be quite ripe but firm, uniformly coloured, without holes and with not too many seeds. hen possible the fruit should be processed without evious washing.

668. van hiele, T. 664.85.715.037
Rassenproef met bramen in verband met de geschiktheid voor snelvriezen 1945-1946. **(Quick freezing blackberry trials.)**
Meded. Direct. Tuinb., 1946, pp. 458-9.

he trials were made with the varieties Himalaya and Laciniata Elégance. Both proved suitable for freezing, Himalaya had the more flavour but Elégance had a better appearance. Freezing without sugar is not very difficult, but the addition of a quantity of dry sugar in the ratio of 20-25% sugar solution, according to the variety, also gives a satisfactory result.

1669. Tressler, D. K. 664.8.047
Some problems of the dehydration industry.
Fruit Prod. J., 1946, **25**: 198-9, 219.

The problems of dehydrating food products, particularly fruit and vegetables, are discussed under: varietal suitability of fruit and vegetables for dehydration; enzyme and blanching studies; improvements in dehydrating processes; storage; refreshing and cooking; packaging; and the uses for dehydrated foods.

1670. Davis, M. B. [Director of Work]. 664.84.047
Dehydration of vegetables in Canada.
Booklet No. 3* of articles from *Food in Canada*, 1945, pp. 1-43.

These articles tell the intelligent man in the street in simple language what are the latest devices for preserving his vegetable foodstuffs by dehydration. The particular aspects dealt with are:—Preparation and pre-processing; mechanics —i.e. the why and how of the use of heat and humidity; construction and operation of dehydration; methods of dehydrating particular vegetables; packaging dehydrated vegetables; food value and keeping qualities of dehydrated vegetables; a method for rapid determination of moisture in dehydrated foods; a rapid control method for determining moisture in dehydrated potatoes. These papers are presented in each case by one or more of the following experts:—H. C. Aitken, M. B. Davis, C. C. Eidt, F. B. Johnston, M. MacArthur, W. R. Phillips.

1671. Division of Horticulture, Ottawa, and others. 664.84.047
More about Canadian dehydration methods.
Booklet No. 5* of articles from *Food in Canada*, 1945, pp. 27, 25c.

This publication, which with Booklet 3 [see above] also appears as an appendix to *Collected Papers of the Canadian Committee on Food Preservation*, Vol. 2, carries the story one stage further. The subjects discussed are:—dehydration costs (C. C. Eidt); oxygen determination in gas-packed dehydrated vegetables (C. C. Strachan); Canadian dehydration of tree fruits (F. E. Atkinson and C. C. Strachan); and microbiological aspects of dehydrated vegetables and fruits (A. H. Jones).

1672. de Arruda Veiga, Ary. 664.84.047
Desidratação e outros processos de preservação dos alimentos. **(Dehydration and other methods of food preservation.)**
Rev. Agric. S. Paulo, 1946, **21**: 141-53.

A general account of food preservation with special reference to the dehydration of vegetable products.

1673. Piettre, M. 664.8.047
Dessiccation aux basses températures ou *Cryodessiccation*; ses avantages théoriques, ses possibilités pratiques. **(Dehydration at low temperatures or cryodesiccation: its theoretical value and its practical possibilities.)**
C.R. Acad. Agric. Fr., 1946, **32**: 70-3.

This is a discussion on the value of low temperature dehydration with special reference to the preservation of fruit and vegetables, and it introduces a paper by Ulrich and Guercin (see below).

* Obtainable from Food in Canada, 73 Richmond St. W., Toronto.

1674. ULRICH, R., AND GUERCIN, J. 664.84.047
Sur les échanges d'eau des légumes séchés avec l'atmosphère ambiante. **(The water exchange between dried vegetables and the surrounding air.)**
C.R. Acad. Agric. Fr., 1946, **32**: 73-5.
The apparatus used by the authors is described and illustrated. Each specimen was suspended on a spring with a graduated scale, in a bolthead flask with a dehydrating agent below (sulphuric acid at a concentration to maintain a known relative humidity). The results were very different with the various vegetables tested; it was necessary to obtain for each the curve expressing the variations of the atmospheric equilibrium in relation to the moisture content of the tissues. Curves were obtained for potatoes, carrots and prunes. The variations in weight of a specimen are the more marked, the further the external conditions are from the equilibrium. Exchange of moisture between the tissues and the surrounding air was very slow and the experiments in consequence very long. The specimens studied became mouldy only with relatively high atmospheric humidity.

1675. ALDERMAN, D. C., AND NEWCOMBE, B. 664.85.23.047
Dehydration of Montmorency cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1945, **28**: 97-106, bibl. 3.
If red tart Montmorency cherries, of which Michigan is the leading producer in the United States, could be successfully dehydrated, it would be a great advantage to the industry. So far, however, all experimental treatments, some of which are described here, have failed to give satisfactory results.

1676. BREMOND, E. 663.25
Moûts concentrés de raisins . . . **(Concentrated grape must: the effect of deacidification on the desulphuring of muted musts awaiting concentration.)**
Ann. Inst. agric. Algér., 1942, **1**: 2: 32-40, bibl. 2.
The author describes the technique involved in (1) de-acidifying a muted must with pure carbonate of lime and (2) concentrating the resulting must both at atmospheric pressure and under vacuum.

1677. CRUESS, W. V. 663.258.4
Spoilage and other microorganisms of wine.
Fruit Prod. J., 1946, **25**: 229-31, 250, 260-2, bibl. 11.
The yeasts and bacteria that cause spoilage of wine are discussed under: film yeasts, other yeasts, acetification of musts, lactic acid bacteria, bitter wines, slimy wine, tartrate destroying bacteria, the "hair bacillus" of wine and malic acid-destroying bacteria.

1678. BREMOND, E. 634.771: 663.52
L'alcool de bananes. **(Alcohol from bananas.)**
Ann. Inst. agric. Algér., 1942, **1**: 2: 126-34.
The ripe banana contains 18% to 20% of total sugars, part reducing sugar, part saccharose. The author describes successful experiments undertaken in Algeria in 1940 to determine satisfactory methods of making alcohol from bananas. Further experiments in 1941 in French Guinea were equally successful and factories were established, the potential output of each one of them being 10 hectolitres of motor spirit a day obtained from 120 to 150 quintals* of raw bananas. General directions for making the alcohol are given.

1679. HAYWARD, F. W., AND PEDERSON, C. S. 633.64
Some factors causing dark-colored maple sirup.
Bull. N. York St. agric. Exp. Stat. **718**, 1946, pp. 14, bibl. 2.
Light colour in maple syrup was found to be associated with low alkalinity and a low invert sugar: sucrose ratio. Bacterial activity causes both an increase in alkalinity and inversion of sucrose, and as a consequence a darkening in colour. Since bacteria occurring on maple sap show appreciable development even at low temperatures, the need is evident for quick handling of the sap to avoid contamination and to obtain a high-quality, light-coloured product.

* 1 quintal—100 kg.

1680. HAYWARD, F. W. 633.64
The storage of maple syrup.
Bull. N. York St. agric. Exp. Stat. **719**, 1946, pp. 8.
A cool, dry cellar is very suitable for storing maple syrup through the summer and autumn. Containers should be filled hot and full to exclude oxygen and contamination.

1681. HAYWARD, F. W. 633.64
Factors in the preparation of maple cream.
Bull. N. York St. agric. Exp. Stat. **720**, 1946, pp. 8.
The difficulties encountered in the preparation of maple cream from syrup with high invert sugar content are overcome by boiling the syrup rapidly to 20° F. above the boiling point of water and then cooling it quickly to room temperature, seeded with a few crystals of dry maple sugar.

1682. CRUESS, W. V. 664.85.035
Jellied fruit candies.
Fruit Prod. J., 1946, **25**: 166-7.
It has been found that apples, peaches, plums, apricots, nectarines and eastern varieties of grapes, such as the Concord, are particularly desirable for making purées for jellied candy from the fresh fruit, but figs, sweet cherries and Bartlett pears can also be used. Among the dried fruits, apricots, apples, peaches and prunes were the most satisfactory, although figs, dates and pears can be used also. Typical fruit jelly candy formulae are given and a method of arriving at the finished product is given in détail.

1683. IGOLEN, G. 668.526.4: 668.5
Les essences d'agrumes, production, composition, emploi en parfumerie. **(Essential oils of citrus, their production, composition and use in perfumery.)**
Fruits d'outre mer, 1945, **1**: 10-20.
The author discusses the essential oils obtainable from particular citrus species, noting where the citrus in question is extracted for the purpose, the types of oil obtained and the uses to which they are put. The species and their oils considered are the mandarin, the bergamot orange, the lemon, bitter orange and sweet orange.

1684. REIG FELIU, A. 634.3: 581.192
Esencias de la corteza del fruto de los agrios. Su origen, extracción, composición y análisis físicoquímico. **(The essential oils of the peel of citrus fruits. Their origin, extraction, composition, and physico-chemical analysis.)**
Bol. Inst. nac. Invest. agron., Madrid, 1945, No. 13, pp. 97-239, bibl. 27.
The scope of this long exhaustive account of the essential oils of the peel of citrus fruits and their preparation as commercial products is shown by its title and more particularly by the headings to the chapters, which are: (1) A general account of the industry and the products of citrus. (2) The development of the essential oils. (3) The basic principles of oil extraction. (4) Classification of the various processes involved in extraction. (5) Procedure of treating the fruit prior to trituration. (6) Procedure of treating the peel already in sections or strips, the juice and pulp being previously removed. (7) The processing of the peel of the whole fruit. (8) Separating, clearing and filtering the oil. (9) The causes of changes in the oil. Storage and preservation. (10) Quantitative analysis. (11) Composition and qualitative analysis of the oil. (12) Deterpenation. (13) Critical review of the methods described. (14) The industry in citrus essential oils. There are 53 figures, mostly drawings and photographs of the apparatus and machinery used in the various processes. Chapter VII (pp. 130-70) with

29 illustrations occupies more than a quarter of the whole article.

1685. MATHOT, H. J. 581.192: 577.16
Factoren die de variatie van het vitamine C in de plant bepalen. **(Factors influencing vitamin C in plants.)**
Meded. Inst. Onderz. Verw. Fruit Groenten Wageningen, 1945, Rks 1, No. 14, 176 pp., bibl. 215.

This investigation aimed at explaining the great variation in vitamin C content in horticultural produce. The method of determination is given in detail. The most important factor determining vitamin C content in plants is the genetical constitution. No correlation could be observed between the place of a genus in a botanical system and ascorbic acid content of taxonomic units belonging to that genus. Diploid species of roses could be subdivided into 5 groups of which the hips of 2 (D and E) had the highest ascorbic acid content; combination of these groups and also chromosome doubling resulted in ascorbic acid contents that were higher, the more D- or E-influence was represented in them. Essentially the same was found with apples. Fruits of diploid species generally have lower contents than those of triploids; vitamin C content of tetraploids is still higher. In red currants strains of the *macrocarpum* variety of *Ribes vulgare* were on the average richer in ascorbic acid than those of the normal *Ribes vulgare*. The fruits of *Solanum racemigerum* are richer in vitamin C than the fruits of cultivated varieties; crossing these varieties with *S. racemigerum* resulted in fruits rich in ascorbic acid, and sometimes of high weight. The effect of soil is uncertain; differences in ascorbic acid content between rose hips from various experimental fields were correlated with the K-Ca-Mg ratio of the ashes of the hips. Favourable weather causes an increase of ascorbic acid. In strawberries the first ripened fruits of an inflorescence contain far more ascorbic acid than later ripening fruit. Dehydroascorbic acid content is very high in some fruits at first but decreases with ripening; in apples with good storage qualities it decreases to zero; in apples with poor storage qualities considerable quantities of dehydroascorbic acid are found at picking time. In no other fruits has this substance been found when they are fully ripe. The ascorbic acid content of leaves reacts to sunlight; in the afternoon it is high, but it decreases during the night. As the fruit ripens the ascorbic acid increases and the dehydroascorbic acid decreases. Treatment with growth substances very soon exerts a strong stimulating influence on the ascorbic acid and total vitamin C content in the bark of cuttings and in germinating peas.

1686. ZEPKOVA, G. A. 581.192: 577.16
Concentration of vitamin C in certain plant species of Central Asia.
C.R. Acad. Sci. U.R.S.S., 1945, **48**: 655-8.

The rate of accumulation of vitamin C in wild roses increases with the ripening of the fruits; these should therefore be gathered when fully ripe. The vitamin C content fluctuates during the day and in rose fruits was found to be at a maximum at midday; it is therefore preferable to collect them about noon. Drying should be done in the shade. Wild roses growing at high altitudes are particularly rich in vitamin C. Leaves of *Rosa* spp. and *Malus pumila* contain insignificant amounts of vitamin C at the time of fruiting; this is probably associated with the movement of ascorbic acid from the leaves to the fruits.

1687. MAXIMOV, N. A., RAKITIN, J. V., AND TUREZKAYA, R. Kh. 635.944: 577.16
A procedure ensuring the preservation of vitamin C in leaves of gladiolus prepared for storage.
C.R. Acad. Sci. U.R.S.S., 1945, **48**: 651-4, bibl. 4.

The authors have examined over 200 varieties of gladiolus and found that a number of them contained from 1·5 to 7% of vitamin C. In order to avoid the undesirable loss in vitamin C that occurs when fresh leaves are stored, preliminary drying (in electric ovens) of the freshly harvested material was applied. The loss in vitamin C during drying differed according to temperature. The least loss occurred when the green mass was dried at 80-100° C. The loss did not exceed 30% at this optimal temperature, while at temperatures departing from it the breakdown of the vitamin was found to be greater. Preliminary treatment with sulphur dioxide proved very efficacious; the loss of vitamin C in the process of drying was only about 10% when leaves were previously subjected to sulphur dioxide, while in untreated leaves it reached 30%.

1688. MOTTERN, H. H., AND KARR, E. E. 634.11-1.57
Determination of pectin grade of apple pomace.
Fruit Prod. J., 1946, **25**: 292-6, 313, 315.

A method is described for evaluating apple pomace by preparing an extract, making a test jelly, and determining the strength of the jelly on a calibrated Delaware jelly tester. The results, reported as "grade", represent the percentage of 100 grade pectin available in the pomace. The jelly-making procedure can be used to control work in pectin manufacture and in evaluating commercial samples of both liquid and dry pectin. [From authors' summary.]

1689. BREMOND, E. 663.25

a Les possibilités d'emploi de l'ionomètre differentiel à quinhydrone. **(The possibility of using a quinhydrone differential ionometer for determining the pH of wines [and a description of the method recommended].)**
Ann. Inst. agric. Algér., 1939, **1**: 1: 110-32, bibl. 7.

b BELTRAN, E., AND RONGIEUX, R. 663.815
Contribution à l'étude physico-chimique des jus d'agrumes. **(A physicochemical study of citrus juices [including a description of technique].)**
Ann. Inst. agric. Algér., 1939, **1**: 1: 133-50, bibl. 21.

c FABRE, J. H., AND BREMOND, E. 663.25: 615.739.11
Étude sur la présence de l'arsenic dans les moûts de raisins et dans les vins. **(Investigation into the presence of arsenic in grape must and wine [and its possible elimination by the addition of monosulphide of sodium $Na_2S.9H_2O$].)**
Ann. Inst. agric. Algér., 1939, **1**: 1: 85-109, bibl. 4.

d GUILLAUME, A., AND BÉGON, H. 635.262
Sur le suc d'ail. Sa préparation, sa teneur en essence, ses usages. **(The preparation, oil-content and uses of garlic juice.)**
C.R. Acad. Agric. Fr., 1946, **32**: 224-6.

e MACARTHUR, M., AND JOHNSTON, F. B. 664.84.34.047+664.84.13.047
Advances in Canadian vegetable dehydration. (1) Cabbage. (2) Carrots.
Reprinted from *Food in Canada*, May and July 1945, pp. 10, bibl. 8, being *Contr. Div. Hort. exp. Farms Serv.* **650.**

f REDER, R. 577.16
Inhibition of oxidation of ascorbic acid by certain vegetable extracts.
Science, 1946, **103**: 201-2.

g RENTSCHLER, H. 663.258.4
Das Braunwerden der Weine. **(The browning of wines.)**
Schweiz. Z. Obst- u. Weinb., 1946, **55**: 156-8.

h TAVERNIER, J., AND JACQUIN, P. 663.813: 634.11+634.13
Composition azotée des moûts de pommes et de poires. Son importance dans la fabrication des cidres et des poirés doux. **(The nitrogen of apple and pear must. Its importance in the preparation of cider and perry.)**
C.R. Acad. Agric. Fr., 1946, **32**: 216-9.

NOTES ON BOOKS AND REPORTS.

1690. ASLIB.* 016: 5(410)
Select list of standard British scientific and technical books.
3rd edition. Aslib, 52 Bloomsbury Street, London, W.C.1, 1946, pp. 60, 5s. or 3s. 6d. to members.

This book was compiled with the help of numerous persons and institutes possessed of special facilities for keeping up to date in particular fields of knowledge. It should be on every reference librarian's table. The great value of such books lies chiefly in their being constantly revised by additions and omissions. If Aslib can contrive to keep this work revised, it will be conferring a great benefit on the student.

1691. BRANAS, J., BERNON, G., AND LEVADOUX, L. 634.8
Éléments de viticulture générale. **(A treatise on the elements of viticulture.)**
École Nationale d'Agriculture de Montpellier, France, 1946, pp. 400, bibliographies, 450 fr.

No one is going to learn how to grow vines from this treatise by the leading experts of the famous Montpellier school. But many who have studied vine growing all their lives and have perhaps at long last become cynical by reason of the wrangling of the professors over the ever-recurring problems presented by phylloxera, court-noué and the like, and of the natural conservatism of generations of vine growers, may take heart at last and look at their problems with a fresh and less jaundiced eye.

We do not suggest that the authors have cut all the Gordian knots of controversy, but they have gone back to basic principles and indicated with no small measure of success why 2 plus 2 sometimes make 5 and how there is no hard and fast rule in vine growing which is not liable to suffer change by a dozen different circumstances.

The authors divide their treatise into 5 parts with a final appendix on experimental lay-out. They are (1) *Vegetative equilibrium in the vine.* The meaning of the term and its possible attainment in different directions are discussed. (2) *The environment of the vine.* Climate, soil, spacing and rootstock are all concerned and receive ample attention. (3) *Exploitation of growth potential.* Varieties and pruning and training are considered. (4) *Correctives of growth potential,* i.e. soil cultivation, manuring and irrigation. (5) *Correctives of growth expression.* Among these, special cultural operations of defoliation, tipping, ringing and debudding are considered.

The work is amply illustrated with line drawings, graphs and maps and contains references at the end of each section for those who wish to pursue the subject. For those who relish the use of symbols we commend the book unreservedly. To those who are not always quite at ease in pursuing logic thus expressed we recommend courage to persevere in the belief that they will find their reward in the elimination of many doubts of long standing and in a much enhanced comprehension of the essential problems of viticulture. The authors refer in their preface to Ravaz, late famous director of Montpellier. This far-reaching work, in which ample attention has been paid to foreign as well as French work, does him further honour. It should certainly be on the shelves of every vine professor, so that he may use it as a measure of success claimed for experiments or as a corrective, if ever he feels dogmatically certain on any given point.

1692. DALLIMORE, W. 631.542: 635.976 + 635.977
The pruning of trees and shrubs.
Dulau, Oxford, 1945, new edition, pp. 99, 7s. 6d.

This useful little manual was first published in 1926 and the steady demand has hitherto been met by reprinting. The destruction of the publishers' premises and stocks by enemy action has provided an opportunity for the issue of a second edition. The methods of pruning here advocated are those practised at the Royal Botanic Gardens, Kew, at which establishment the author was himself for many years something of an institution, being in fact responsible for the evolution of much of the technique described. The patients involved in these surgical operations, which range from minor amputations to virtual disembowelment, are mainly ornamental trees and shrubs, particularly wall shrubs. Fruit trees and roses are not included, since the literature is already extensive with no signs of a falling birthrate. To some the omission will not be unwelcome. Complicated obtestations on the mysteries of fruit tree pruning affect many a one much as discussions on metaphysics used to affect old Omar; even if not driven to seek the solace of the book of verse and the other indicated desiderata, he is certainly liable after hearing "great argument about it and about" to come out by the same door as in he went. Mr. Dallimore's instructions for the repair of ornamental trees are not like that. Clearly and with the aid of excellent illustrations he tells you just what to do and how to do it—if you can (it may involve complicated manoeuvres with strong men, ropes and even bricks and mortar in the more difficult cases). He is no sentimentalist either; is adverse to retaining old trees no longer suitable for their site just because they have always been there. Island trees on roads, for instance, however historic or picturesque, are dangerous, and if the road must encompass them it is better they should go. The ordinary small garden owner is likely to refer most often to the chapters on the pruning of the smaller garden trees, the flowering shrubs and climbers, for the book, being the work of a man who has spent his life with the plants of which he writes, is able to provide much curious information as to their many idiosyncrasies, which might not be otherwise available and certainly not collected within so few pages as here. Particularly instructive is an alphabetical list of shrubby plants and climbers with instructions for pruning—or not pruning—each. This list is very comprehensive and includes practically all the genera which will support outdoor life in Britain, if only for a few seasons. In conclusion, to indicate the scope of the book, it may be recorded that the trees and shrubs are classified and dealt with separately under these heads—deciduous ornamental; young trees; neglected broad-leaved trees; old broad-leaved; evergreen broad-leaved and conifers; park, street, woodland and hedgerow trees; flowering trees, hedges and shrubs. Many gardeners will have this book; to those who have not we say "Get it".

G.St.C.F.

1693. GEMINOVA, N. V., KRASSNOSSELSKAJA, T. A., AND USSOWSKY, B. N. 41.3: 6: 91.7
English-Russian Agricultural Dictionary.
Moscow Gostechizdat, 1944, pp. 331 and 155 illustrations, 15s.

The attention of horticultural students struggling to cope with Russian is drawn to this fairly recently published dictionary—obtainable presumably, as in our case, through any bookseller. It does contain a large number of horticultural terms and the very simple illustrations are also useful.

1694. HOWARD, W. L. 634/635: 631.52
Luther Burbank, a victim of hero worship.
Chronica Botanica, Waltham, Mass., U.S.A.; Wm. Dawson & Sons, London; being *Chron. bot.*, Vol. 9, Nos. 5-6, pp. 299-522, bibls., 3.75 dollars.

Luther Burbank, the world-famous American plant breeder who died in 1926 at the age of 76, was for many years of his life a storm centre of furious discussion and debate. To the general public in America he became a kind of superman working more or less under direct Divine inspiration,

* Association of Special Libraries and Information Bureaux.

onception which Burbank himself seems not to have onsidered unreasonable. To his detractors, among whom vere to be found nearly all the trained scientists of the time, nany religionists, nurserymen competitors and those who ost their money in certain badly-run commercial ventures xploiting his name, he was a hit or miss charlatan, a putter- ut of exaggerated or false claims for unworthy products, promoter of dud companies, a man of dubious probity in usiness affairs and, of course, an atheist. Yet the magnet- sm of this remarkable man was such that no one who had nce met him in social contact could ever be induced to peak ill of him, even when aware of his limitations. In this tudy of Burbank, his life and environment, Professor Howard has endeavoured to discover and set out the truth ather than to bend it, as in the case of some of the earlier iographers, to fit his preconceived ideas. Howard reveals man with complete belief in himself and his products, esentful of criticism, intensely egoistic yet intensely shy, ithout scientific or indeed any other education than that btained by reading Darwin's *Cross and self fertilization in he vegetable kingdom*, yet so perceptive of the possibilities f plant improvement exposed by Darwin's work to those ho could see, that while still in his impoverished twenties e could leave his Massachusetts home, obtain land in alifornia and build up a plant breeding station that ttained world-wide renown. Divested of the glamour of nystery sedulously fostered by sensational space writers of he American press, Burbank's methods were prosaic nough and well known to horticulturists, namely the rossing of varieties to commingle their characters and electing from the resultant seedlings those that were ifferent. That others practised this method without ttaining Burbank's results was perhaps because they did ot work on the immense scale that he considered necessary. Nor, possibly, did they possess his discerning eye for those nfinitesimal changes in leaf and form which enabled him, e claimed, to appraise the value of a hybrid long before he appearance of flowers or fruit. Empirical though his ork may have been, Burbank introduced 250 varieties of uit alone, 113 of them being plums or prunes. His plum ybrids formed the basis of a huge industry in California nd at the present day two million of his trees are grown here. In all he performed selection or hybridizing experi- ents with 188 plant genera, each cross involving the use f 1 to 3 species and in the case of some Liliums as many as 0. Of these, 121 genera yielded varieties worthy of ntroduction and, although ten years is the estimated life f a novelty before supersession, many of Burbank's roductions are still familiar. The evolution of the Shasta aisy, now found in every garden, is, after the plum, egarded as his greatest triumph. In this a wild unidentified hrysanthemum from New England or California was ombined with *C. maximum* and *C. lacustre* from Europe nd *C. nipponicum* from Japan, the latter contributing the azzling whiteness which is the characteristic of the modern ybrids. All horticulturists may not care to read of the icissitudes and polemics of Burbank's career, but none hould fail to appreciate Chapter XIX which contains a ummary of his chief productions and their lineage. Bur- ank apart, the Britisher will benefit by reading this book or its revelation, possibly unconscious, of American haracter and mode of thought. If it leaves him bewildered, will not leave him unsympathetic. G.St.C.F.

695. HURT, E. F. 633.854.78
Sunflower for food, fodder and fertility.
Faber & Faber, London, 1946, pp. 155, bibl. 35, 10s. 6d.

his book is issued at a most opportune moment when the orld, and Europe in particular, is crying out for fats. the sunflower we have a plant which can be successfully rown over a large part of England and Wales and the outh-eastern tip of Ireland, and which produces an oil equal olive oil in its edible qualities, in lack of taste, colour and keeping quality. While the olive needs at least 8 years to attain economic maturity, the sunflower is an annual and can follow in any farm rotation. The oil has also many other commercial uses such as for paints, soaps and cosmetics. As a paint oil it claims to be a 26-hour drier as against linseed's 34 hours. The seed is valuable for poultry, certain varieties are good honey plants, the dried heads, after deseeding, are a valuable source of feeding stuffs for cattle. Moreover, when the stalk is returned to the soil as ash, compost, or direct, it is not an exhausting crop. In U.S.A. and Rhodesia it has proved a useful silage crop. It is in short a crop of enormous potential value.

Hitherto it has been very little grown in this country, but research by G. E. Blackman and others since the beginning of the recent war has blazed a trail, which can and should be followed by those who want to make these islands less dependent on the outside world for a most vital item in its food supplies.

If, as is hoped, cultivation proceeds apace of this most valuable crop, there will doubtless be a succession of instructive articles written as experience grows. Meantime we are extremely grateful for this lively and enlightening manual, in which the author, while by no means boggling at the many difficulties to be overcome in this country, gives an account of the salient points in cultivation, pest and disease control, harvesting and processing.

He pays considerable attention to methods of harvesting. In dry East Anglia combine harvesters seem to have proved successful, but success can only be expected when the plants are thoroughly dry. Hence for much of the country he considers that the solution of the problem of harvesting will be found to lie in a machine which will dehead and deliver into a trailer ready for threshing with a sheller, since the sheller will deseed the heads even if the moisture content is as high as 45%. The book is profusely and excellently illustrated.

1696. LIBERMAN, J. 634.3-1.564
The picking and packing of citrus fruits.
[Hebrew.]
Sifriat-Hassadeh, Tel-Aviv, 1945, pp. 171.

This is a comprehensive illustrated manual on the technique of picking, packing and transporting citrus, dealing with all the normal practical problems likely to arise in Palestine. Under Transportation, not only transport but fruit inspection and general hygiene in orchards and packing house are dealt with.

1697. NEERGAARD, P. 632.48
Danish species of **Alternaria** *and* **Stemphylium.** *Taxonomy, parasitism, economical significance.*
E. Munksgaard, Copenhagen [and possibly Humphrey Milford, Oxford Univ. Press, London], 1945, pp. 560, bibl. pp. 34 (price not stated, estimated at approx. 60s.).

This comprehensive study of the two economically important fungus genera *Alternaria* and *Stemphylium*, was carried out at the phytopathological laboratory of the Danish seed firm J. E. Ohlsens Enke, Copenhagen. In the illustrations given the spores are all drawn to one magnification (×450) and a loose scale is provided so that the dimensions of any spore figured can be read directly. The scale card also shows degrees of infection for comparison with figures showing results of inoculation experiments. The comparatively short chapter on control (7 pp.) gives a summary of the relevant literature, supplemented by some observations of the author. A table presents data on the dose of certain chemicals to be applied in seed treatment, on the completeness of disinfection obtained and on the effect of the treatment upon the germination power of the seed. A brief introduction to his vast subject was given by the author in a lecture held in June 1945 at the Kgl. Veterinaer- og Landbohøjskole, Copenhagen, reprinted from *Haverbrugsforskning*, 1945, No. 11, pp. 153-60.

1698. OLDHAM, C. H. 634.7(42)
The cultivation of berried fruits in Great Britain, Crosby Lockwood, London, 1946, pp. 347, 21s.

New books dealing with tree fruits are frequently published, but one devoted entirely to berried fruits is uncommon and therefore of special interest. The author is very capable of dealing with this side of the subject because much of his life as an Inspector for the Ministry of Agriculture has been concerned with the observation of berried fruits under widely different conditions. If the proverb is true that " the spectator sees most of the game " then his knowledge must be considerable and worthy of attention.

The book is divided into six parts, each part being devoted to one kind of fruit. These are, respectively: The Black Currant, Red Currant, Blackberries and Hybrid Berries, Raspberry, Gooseberry and Strawberry. The botanical and historical features are of much interest, particularly since Mr. Oldham has discovered earlier records of the red currant than any previously recorded in this country, but he could have made a more complete picture of the development of the strawberry by reference to the genetical work of the John Innes Horticultural Institute. Types and varieties are dealt with at length, but again it is surprising to find that credit is not given to Hatton and Amos for their classification of black currants. Many of the strawberry and raspberry varieties described are more of historical interest than economic value at the present day, while the Worcester Berry is generally accepted to be a species and not a hybrid between a black currant and gooseberry.

The cultivation of the soil for each kind is fully described, as are also manuring, planting, pruning, etc. In dealing with these and allied operations as wide a field as possible has been covered because no one knows better than the author that, while a certain practice may suit one locality, it would not meet the requirements of another.

One of the most important parts of the book is that dealing with picking and marketing. Information is given in detail on picking, receptacles, grading under the National Mark Scheme, etc., and should prove invaluable to those growers who wish to raise the present-day low standard of presentation and marketing methods.

As might be expected, lists of pests and diseases and their control are given, but it is surprising that Mr. Oldham has overlooked the valuable work being done at the West of Scotland Agricultural College in the breeding of strawberries immune to red core disease, some of which have already been planted commercially in Scotland and the North of England.

Throughout the book considerable use has been made of information taken from the Reports of the Research Stations, but for some unknown reason the author has failed to record recent developments at these stations. For instance, no reference is made to the important work on the breeding of new raspberries at East Malling, or to the latest methods of propagating raspberries and strawberries adopted at that station.

As to the book itself, it is well printed and there are few printing errors, but the presentation could be bettered. For example, the page headings might well indicate the kind of fruit under discussion rather than the subject matter, while the indexing could be improved.

It is easy to criticize a comprehensive book such as this, and the omissions which have been mentioned do not detract to any great extent from the value of the work. It is to be welcomed as the best book yet produced on Berried Fruits, and as such it ought to be in the possession of anyone interested in the cultivation of these fruits whether professional or amateur. J.M.S.P.

1699. QUARRELL, C. P. 635.5: 631.944
Intensive salad production.
Crosby Lockwood, London, 3rd edition, 1945, pp. 250, 15s.

A third edition* of this well-documented book is very welcome. In the second edition of 1944 considerably more attention is paid to the growth of outdoor cucumbers and tomatoes and to the cultivation of the vitamin-rich mustard and cress and these notes are reproduced here. In both the second and the third editions continuous cloche cropping is dealt with at considerable length and the latest methods used in this particular branch of horticulture are described. Among specific subjects considered are manuring, irrigation and the supply of water, the construction and erection of lights, soil warming by manure, water, steam and electricity, French methods, Dutch methods; types of cloche and other protecting devices; glasshouses; diseases and pests; the production of beet, celery, chicory, chives, corn salad, cress, dandelion, endive, lettuce, melon, radish, spring salad onions, watercress, tomatoes and cucumbers. The appendices deal with grading, packing and marketing and with measurements, planting tables, etc. It seems a pity that the figures given for imports of salad crops are still those of 1938, but that is scarcely the author's fault. There are a few additional illustrations, and line drawings clearly show three different methods of strip cropping.

1700. ROIG, J. T. 633.88(729.1)
Plantas medicinales, aromáticas o venenosas de Cuba. Parte I and Parte II. **(Aromatic or poisonous medicinal plants of Cuba.)** [In two volumes.]
Publicaciones Técnicas Republica de Cuba Ministerio de Agricultura, 1945, Parte I, pp. 1-448; II, pp. 449-872.

The author gives in each case synonyms, habit and distribution, use and other notes of interest on the hundreds of Cuban drug species, providing also names of further authorities whose works may be consulted. The plant names are well cross-referenced and the print is clear.

1701. SALTMARSH, E. R. 631.544
Glass house food crops.
Crosby Lockwood, London, 1945, pp. 153, 12s. 6d.

The present volume covers almost the whole field of glasshouse food crops and includes chapters on Situation; Soil and layout; Glasshouses and their erection; Heating glasshouses; Equipment; Expenditure, yields and returns, etc.

It has been produced, we are told in the introduction, to fill a gap in horticultural literature which contains no book on the subject that can be recommended to students and growers, but in the opinion of the reviewer, for reasons set out below, the gap remains unfilled.

The author makes no mention of the valuable work on the subject which has been and is being carried out at the Cheshunt Research Station.

The book is insufficiently edited and contains both errors and inconsistencies. Thus " double digging " is referred to as " bastard trenching ", " runner beans " as " kidney beans ". On page 35 reference is made to the steam-to-water system of heating, and it is stated that two boilers are required, " one producing hot water and the other steam ". The statement is also made that Cornish and Lancashire boilers are used for hot water as well as steam production. Surely this is incorrect.

Much information is left indefinite, where a definite statement is possible and essential. Thus on page 27 we find that " provision might have to be made for a soil baker " but surely sterilizing of soil is now essential and provision *must* be made for either steam sterilizing plant or a suitable type of baker.

Moreover in the chapters concerned with actual cultivation of the crops in the glasshouse, many details of the utmost importance to students are omitted.

Finally the figures given on Expenditure, returns and yield

* For 1st edition, see *H.A.*, 9: 351.

fer mainly to the pre-1939 period and are now of doubtful alue, if not positively misleading.
here are many useful diagrams on glasshouse construction nd the illustrations are good. With careful editing it ould have been a valuable addition to horticultural terature. W.C.

702. TUKER, G. 634/635(41/42)
The horticultural industry in the Dominions and the United States of America.
National Farmers' Union, Bedford Square, London, W.C.1, 1945, pp. 119, 5s.
his book is a hotchpotch of interesting observations made uring a tour in Australia, New Zealand, Canada and the .S.A. in the winter of 1944-45, together with copies of lletins and public addresses or statements on special ases of the horticultural, particularly fruitgrowing, dustry. In the text we fairly often find the words "I was ld" or "it seems likely", but despite this the author does anage to give us some of the salient facts which mark the dustry in the parts visited. *New Zealand.* There is a tal acreage under apple, pear and stone fruits of 16,500 cluding 1,120 orchards of 1-5 acres and only 11 over) acres. Cox's Orange Pippin is losing favour. It comes ry early in the season, is tricky to grow, its yield is light, keeping quality none too good. Observations were made Nelson Province, Otago, Hawkes Bay District, and the esence is noted of a vine and citrus area in the northern rt of North Island, Auckland Province. *Australia.* smania is the chief single export area for apples and pears the Commonwealth, with its main fruit areas the Huon nd Hobart areas and the Derwent and Tamar Valleys. ops are successfully grown in the Valley of the Styx. As gards Victoria, notes are given on the Doncaster Fruit rea, the Mornington Peninsula Area, the Goulburn Valley nd on the Victoria market at Melbourne. South Austra-n, N.S. Wales and Queensland conditions are more iefly touched on, particular mention being made of the rogressive marketing organization established in Queens-nd. *Canada.* Fruitgrowing conditions in B.C., Ontario lso glasshouse], Nova Scotia and Quebec are discussed. n address delivered by A. K. Lloyd to Nova Scotian owers on Grower Co-operative organization in B.C. is produced.
Machinery. In the author's opinion the three most useful eces of machinery not known generally in U.K. but used Australia or in the U.S.A. [items 2 and 3] are (1) the etty Plow, an offset disc plough used for turning in cover ops and for rooting cultivation, (2) the Hercules "Brush ıredder" for shredding prunings and incorporating them to the soil, and (3) the Speed Sprayer.
Costs of production. Two reports are reproduced on this bject. The first is Bull. Wash. agric. Exp. Stat. 446, 1945, M. T. Buchanan entitled "Washington apple production sts during the 1943-44 season" and the second "Fruit-owing costs" is a detailed statement from the N.Z. uitgrowers' Federation Ltd. to the Chairman of the abilization Commission, Wellington, N.Z. In addition bulated data are included on packing costs in New aland, Australia and U.S.A. (Wenatchee). A tabulated chard survey of the Okanagan Horticultural District B.C. 1940 is included and the last article is a reproduction of nadian Govt. Publ. 4 by C. M. Collins referring to nditions in 1939 and 1940 entitled A Census of Nova otia Apple Orchards.

703. LEDIN, G., AND OTHERS. 635.1/7(48.5)
40 år för svensk trädgårdsodling. S.H.T.F. 1903-1943. **(Forty years of Swedish market gardening. Swedish Market Gardeners' Society 1903-1943)**
Sver. Hand. Trädgårdsmäst. Förb. Jubil. Skr. jämte Årsbok 1942, Stockholm, 1943, pp. 369.
ith the exception of one article in part III (see *H.A.*, : 1454) interest in this jubilee publication by the Swedish Market Gardeners' Society (S.H.T.F.) centres round the topical papers in part II, pp. 71-181, which are individually abstracted (*H.A.*, 16: 1293, 1300, 1306, 1327, 1453, 1458, 1524) or noted (*H.A.*, 16: 1581a, 1314b, 1314g). Part I, pp. 7-68, deals with the history of the Society since its foundation, while the yearbook for 1942 is added as part III, pp. 185-368.

1704. WORK, P. 635.1/7
Vegetable production and marketing.
John Wiley, N. York; Chapman & Hall, London; 1945, pp. 559, bibls., $2.75.
This book appears most opportunely at a time when hundreds of men are leaving the Forces, want to take up market gardening and in many cases decide to go as pupils on an up-to-date farm and read up the theory in their spare time. Their aim is, not to pass examinations at a college, but to observe the best modern practice, understand the reasons for it and later adapt it to suit their own conditions.
It seems to us that Work's book should be ideal for their purpose. The author, professor of vegetable crops at Cornell, writes "primarily for students and teachers of agriculture in . . . colleges. Nor have the needs of actual farmers, home gardeners and those engaged in . . . businesses serving vegetable growers been overlooked". He does not just wade in with detailed instructions on exactly how to grow different vegetables, in fact less than half the book is devoted to such details. Instead, he starts at the beginning and gives the more elementary basic facts of plant growth, on which all vegetable growing ultimately depends, then deals with the necessity of certain practices essential to success and only finally comes down to details of the cultivation, harvesting and marketing of particular vegetables.
In his all-important introductory and largest portion of the book he deals with the following among other problems:—Food values of different vegetables; farm management (briefly) including lay-out, labour costs and returns; marketing including handling, packing and transport; machinery (also in separate sections); nature of plant growth; choice of seed; soils and fertilizers; soil treatment and transplanting; irrigation practice; pests and diseases; storage.
With this background of why and wherefore, the student then gets specific instructions on how to grow the following crops:—peas and beans, vine crops, i.e. melons, cucumbers, squashes and pumpkins, onions, cabbage family, celery, lettuce, spinach, asparagus and rhubarb.
Admittedly the specific advice is particularly applicable to American conditions, but this in no way detracts from the great value of the general principles enunciated in a manner concise, clear and arresting.

1705. CANADA. 633/635(71)
Report of the Science Service, Dominion of Canada Department of Agriculture, for the year ended March 31, 1945, 1946, pp. 66.
This report is reprinted from the Report of the Minister of Agriculture for the same period, the chief horticultural features of which have already been noted in *Horticultural Abstracts*, 16: 1212. The Science Service includes the following Divisions concerned with plants:—Botany and Plant Pathology, Chemistry, Entomology, Plant Protection. This report includes a directory of the Science Service Offices and Laboratories in different parts of Canada.

1706. CHESHUNT. 631.544
Thirtieth Annual Report of Cheshunt Experimental and Research Station 1944, 1946, pp. 83.
Bomb damage suspended work in the laboratories in July 1944 for a few days and ruined experiments then in progress in the glasshouses. The damage was repaired in time for the winter lettuce crop. A very large number of experiments and data derived from them are very briefly discussed, among them the following:

Director's report. Results since 1940 were confirmed by a further season's work and showed that sulphate of potash can be satisfactorily replaced for 5 years, at least in the soil of Cheshunt, by muriate of potash. The relative effects of horse manure, Adco-composted straw and sewage-straw compost as a basis for tomato house soil were compared and are tabulated without comment. A water (gravel) culture experiment with tomatoes and carnations had to be abandoned as the result of bomb damage. Trials at 51 centres in England and Wales of the cultivation of 4 dwarf varieties and 2 bush varieties of tomato, with Ailsa Craig as a control, indicated that they were not so good as the best standard outdoor varieties. Notes are given on individual performances.

Plant diseases. Culture tests indicate that it would not be possible to acidify soil sufficiently to make it unfavourable to the growth of *Verticillium* wilt. Observations on the incidence of *Didymella* stem rot of tomato were continued. Trials with lettuce and earlier work on tomato suggest that resistance to virus infection can best be maintained by not applying soluble fertilizers in excess of the immediate needs of the plants. Trials gave but little evidence that mosaic infection brings about a greater reduction in tomato yield under any one watering frequency than under any other.

Pests. Notes are given on the dispersal of the red spider (*Tetranychus telarius*) in tomato houses. Experiments showed that lettuce can be successfully fumigated with HCN in concentrations higher than those necessary without injury to seedlings or older plants growing in the ground. Excellent control of the tomato moth (*Polia oleracea*) was obtained by the use of DDT dusts and sprays on the caterpillars. DDT was also very promising against sciarid flies of mushrooms and there are indications that its addition to petroleum oil emulsion may be valuable for white flies (*Trialeurodes vaporariorum*). Numerous observations are reported on the incidence, habits and possible control of tomato leaf miners (*Liriomyza* spp.) and it is suggested that measures most likely to reduce infestations are steaming the soil of propagating houses before introducing the staging and the growing of plants with a harder type of foliage in nurseries, the houses of which have been found to contain the pest in the previous season. The application to infested tomato soils before planting up of a sodium thymolate solution did not protect the plants from eelworm attack.

Chemical problems. Three types of magnesium deficiency symptoms in tomato are discussed, namely those due to physiological strain, those due to unsuitable physical conditions in the subsoil, and those due to deficiency in open soils. Epsom salts, 2% in water, will generally correct the deficiency, a wetter to eliminate scorch danger being desirable. Under certain circumstances manganese deficiency can be eliminated by the use of manganese sulphate at a concentration of 0·75% in water. Work is reported on the effect of boron, iron, magnesium and manganese deficiencies in Cheshunt Early Giant lettuce. Work is in progress on the use of 2,4-dichlorphenacetic acid and naphthoxyacetic acid for inducing fruit set in tomatoes. A report is given on the determination of "available" potash and phosphoric acid in tomato soils. Under Cheshunt conditions 0·5 N acetic acid solution shows most promise as an extracting solution.

1707. DELAWARE. 633/635(751)
Annual Report of the Director, Delaware Agricultural Experiment Station, for 1944-45, pp. 43, being *Bull.* 259.

Dept. of Horticulture. There are indications from trials in progress that the application in spray form of beta methyl alpha naphthalene acetic acid at 5 p.p.m. and nitrate of soda solution at 1 oz. per gallon may prevent the fall of flowers and pods of lima beans in hot dry weather. Trials are reported on the yield of tomatoes on their own roots as compared with tomatoes grafted on jimson weed (*Datura stramonium*). A vigorous variety, Rutgers, yielded best when not grafted, whereas the moderately vigorous, Stokedale, gave an 18% increase in yield when grafted. The u of methyl bromide fumigation against japanese beetle apple carloads resulted in very serious surface scald an internal breakdown in Williams but not in Starr an Wealthy apples, which also formed part of the consignmen *Dept. of Plant Pathology.* The breeders have produce several strawberry seedlings showing good commercia qualities combined with resistance to red stele, one of thes also showing remarkable frost resistance. Notes are give of work with new fungicides and seed protectants.

1708. "FARMING." 63(05)
Farming, Vol. 1, No. 1, March-April 1946, Empire Press, Norwich, England, pp. 1-32.

The first number of a periodical bearing the sub-title "Th magazine of agricultural progress" is welcomed. Its ai is the interpretation in non-technical language to workin farmers, horticulturists and others of the experiment results in their particular field. If the present number is fair sample, this should be achieved, for in it are high illuminating articles by G. E. Blackman on weed contro M. B. Crane on pollination work, and J. J. Wright on th National Institute of Agricultural Engineering.

1709. GEORGIA. 634/635(758)
Fifty-seventh Annual Report of Georgia Experiment Station 1944-45, pp. 91.

Very short notes are given of the progress or, in one or tw cases, the results of experiments on different crops. Inve tigations thus noted include work on the following subject peanut breeding, cultivation and chemistry; breeding melons and tomatoes; processing of blueberries, apple raspberries and blackberries, vegetables and peanut nitrogenous manuring of peach trees; blackberry an dewberry cultivation and training; growth of trees for post

1710. INDIAN TEA ASSOCIATION. 633.72(541.2)
Annual Report of the Indian Tea Association (Scientific Department) Tocklai for 1945, 1946, pp. 18.

Shortage of staff is still a grave problem and apart fro breeding but little routine work was possible. Furthe investigations on black rot (*Corticium invisum*) disclosed sclerotial resting stage. Observations on the effects shade were continued. Trials showed no appreciab difference in growth into mature bushes as between cuttin and seedlings. The non-hoeing in of manures is found n to result in appreciable loss of nitrogen. Most of the repo (pp. 8-18) is devoted to the position of the breeding pr gramme on 15 November, 1945. The following phases a discussed:—Method of breeding, line breeding at Tockl mass selection at Tocklai, clonal gardens, time lag (minim time needed in line breeding from establishment of see bearing grafts to first back cross is 6 years), propagati (including packing of material), cuttings (effects of seaso use of growth substances, etc.), bud grafts (field techniq now satisfactory), classification.

1711. INSTITUT DES FRUITS ET AGRUMES COLONIAUX. 634.1/8(05)
Fruits d'outre mer, Vol. 1, No. 1, September 1945, Paris 9e, 10 rue Lafayette, foreign subscription rates 80 fr. a number or 850 fr. a year.

We draw the attention of our tropical, and especia sub-tropical, readers to this new French monthly periodic Ten numbers have now appeared and have served to confir the favourable impression made by the first. Each numb so far has consisted of two or more original articles in form of a survey of the present knowledge on particu phases of scientific work specially interesting to sub-tropic fruitgrowers. These are followed by notes of varying leng on work on present problems in different parts of the wor In addition, each number includes a certain number abstracts, which are bound separately and can, if wish form a volume of their own.

ıbjects surveyed so far include:—substances which induce
olyploidy, citrus essential oils, the effect of cold on fruit,
orld production of citrus, citrus rots, sub-tropical medicinal
uits and seeds, pineapple markets.

712. JAMAICA. 633/635(72.92)
Annual Report of the Department of Agriculture, Jamaica, 1944-45, 1946, pp. 14.

he major fact in Jamaican agriculture in 1944 was the
rricane of 20 August which very badly affected the main
conut areas, some 40% of the palms being destroyed.
he winds also destroyed 90% of the banana plants.
elatively small damage was done to orchard crops including
trus. Investigations with many crops were very seriously
ecked, if not entirely brought to a standstill. An account
given of the work which was found possible.

713. JOHN INNES. 634/635
Thirty-sixth Annual Report of the John Innes Horticultural Institution 1945, 1946, pp. 28.

irector's report. An account is given of the sequence of
ents leading up to the purchase of Bayfordbury Park
cluding the mansion and some 372 acres about a mile
om Hertford and 16 miles from London. This will be
e new home of the Institution. The attention now paid
bees is noteworthy and beekeepers will be interested in the
ief note of entirely successful treatment of foul-brood by
e use of soluble sulphapyridine 0·25% fed in warm syrup
the rate of 7 fluid oz. per feed at 2-day and later 3-day
tervals, the cure being complete in 35 days.
omology Dept. High yields were maintained in their
cond year of cropping by hybrid F_1 raspberries. Pollina-
on tests show that Merton Heart cherry is in incompatible
roup VI and Merton Bigarreau in Group II. Both these
vo new varieties have grown healthily and vigorously,
oth the quantity and quality of their fruits have been
nsistently good. Compact habit and early maturity are
ted in a new haricot bean, Merton Haricot. The seeds
e white and thin-skinned. Yields from hybrid tomatoes
trial are much higher than from their parents. One aim
ith tomatoes is the production of varieties combining
gher yield with earliness. Observations indicate that of
e dwarf tomatoes, First in the Field, Premier and Q.77
e identical. Work is in progress on the breeding of
ost-resistant tomatoes. Work on the production of
iploid varieties of apples progresses. The plants raised
e vigorous and the triploids from Northern Spy should
mbine the immunity to woolly aphis possessed by the
ploid with greater vigour than the diploid. Brief notes
e given of the noted effects of the following chemicals on
ant cells:—camphor (on yeast cells), lactic acid, DDT
d gammexane, the sulphonamides. Investigations are
ported into the reason for delayed germination following
e use of temperatures about 5° C. below the death point
the drying of seeds. Inter-specific sterility and incom-
tibility in *Rubus* with particular reference to Youngberry
d Loganberry are discussed.
enetics Dept. Work on the isolation requirements of seed
ops, particularly radishes, turnips, beet and maize and to a
sser degree beans and barley, shows that even under
nditions most favourable to it contamination falls to 1%
150 ft., or under less favourable conditions at only 15 ft.
yond this point contamination does not seem to fall over
stances up to 600 ft. in the insect-pollinated crops, though
does fall steadily in wind-pollinated plants. The fact that
s does not appear to agree with growers' observations
uld seem to indicate pre-contamination, e.g. in threshing
achines, seed drills or stores.
tology Dept. The chief problem now under examination
ncerns the effects of X-rays on nuclei undergoing meiosis.
rden Dept. Experiments are reported on different
edling treatments. The results show that the following
e of the utmost importance to crop:—(1) quality of
mpost, especially with regard to fertilizer concentration
d balance, (2) the elimination of all unnecessary disturbances to the root system as from pricking off late, potting-off, potting-on and transplanting and (3) the feeding of root-bound plants with a balanced fertilizer. In comparison the use of firm or loose, or warm or cold soil, of warm or cold water, of different methods of crocking, of different kinds of pits and of spacing on the bench is of minor importance. The effect of glass in obstructing light is being investigated.

1714. MASSACHUSETTS. 633/635(744)
Annual Report of Massachusetts Agricultural Experiment Station for 1944-45, pp. 71, being *Bull.* **428.**

Pomology Dept. Much damage was done by hurricane to apple trees on dwarfing stocks, particularly Malling IV and IX. Experience has shown that trees on the semi-dwarfing apple stocks are likely to start bearing 2 to 4 years earlier than those on seedling stocks. Marked incompatibility has been found to exist between clonal stock Spy 227 and many apple varieties. Gas storing McIntosh apples in 9-11% CO_2+12-9% O_2 resulted in much more scald than storing in 5% CO_2 and 2% O_2. Notes are given on the 25-year-old cultivation *versus* sod orchard trial. Nutritional and frost resistance studies on blueberry are reported. Tests of preharvest sprays to retain fruit on the tree indicate that more effective materials than naphthaleneacetic acid will be found. Work was devoted to magnesium deficiency in apple orchards and its possible control. An application of ammonium sulfamate was successful in killing grass weed round apple trees without damage to the trees. *Botany Dept.* Work on propagation by cuttings, with and without growth substances, of blueberries, apples, roses and other plants. Control of soil-infesting organisms, e.g. club root, damping-off fungi, etc. Selection and breeding for leaf-mould resistant tomatoes. Apple spray materials and their admixture. Toxic effect of wood preservatives. Chlorine toxicity to woody plants. *Dept. of Chemistry.* Effect of calcium and magnesium on composition of lettuce. *Cranberry Station.* Cranberry pests and their control. Winter killing of cranberries. *Dept. of Entomology.* Work on insecticides, especially DDT, onion thrips control, celery plant bug (*Lygus campestris*), greenhouse fumigants, plum curculio control on apples, cabbage flies, greenhouse red spider. *Dept. of Floriculture.* Work on:—breeding of snapdragons, carnation disease resistance, anemone culture, propagation of geraniums and carnations from cuttings.

1715. NEBRASKA. 633/635
Fifty-ninth Annual Report of Nebraska Agricultural Experiment Station, 1945, 1946, pp. 119.

More attention is devoted to field than to horticultural crops. Potatoes and tomatoes, however, are important and reports are given of cultural, storage and breeding work on the former and of ascorbic acid content tests on both these crops. Apple rootstocks under examination are Virginia Crab, Hibernal and *Pyrus ioensis* seedlings. Trials are in progress on the effect of various delayed-action sprays, e.g. 2,4-D, *a*-naphthaleneacetic acid, on apple, cherry and apricot trees, applied in an attempt to retard bud opening. It was found possible to use DDT effectively and safely in Nebraska potato fields without disturbing the biological balance.

1716. NEW YORK STATE HORTICULTURAL SOCIETY. 634(747)
Proceedings of the N. York State Horticultural Society, 91st Annual Meeting 1946, pp. 352.

This short volume is well up to standard with its many stimulating and suggestive articles of general interest to fruitgrowers. Among such subjects dealt with, sometimes in one, often in many articles, with a summary of results noted, the following occur:—*Dusting and spraying by aeroplane or by helicopter* [pp. 91-6]. The helicopter appears to have many advantages but to need a greater

capital outlay. *The use of spray-dusters* [pp. 148-60 and 254-6]. Progress reported on use of machinery applying a wetted dust. *Frost injury and its prevention* [pp. 174-88]. Accounts are given of smudging, heating and watering experiences. The discussion was summed up by M. B. Hoffman of Cornell University. Watering has proved dangerous, smudging ineffective, heating with small fires (oil or solid fuel) is likely to afford protection, but under New York conditions over a long period its economic value is doubtful. *DDT effect on most fruit insects* [pp. 63-82 and 192-215]. More or less confirmation of results achieved elsewhere. *The work of the Experiment Stations at Ithaca and Geneva on behalf of fruitgrowers* [pp. 242-53].

1717. PALESTINE. 633/635(569.4)
Annual Report of the Department of Agriculture and Fisheries, Palestine, for 1944-45, 1946, pp. 16, 100 Mils.

Another good season was reported by the vegetable seed producers. Attention is now being paid at the Government Farm and by the Jewish organizations to improving quality and testing new types. As regards fruitgrowing, Arab farmers are mainly interested in planting olives, apples and plums and Jewish farmers in apples, plums and table grapes. Investigations are reported into methods of potato cultivation, including propagation from pieces, breaking of dormancy, degeneration of seed. Work at the 8 Horticultural Stations was normal and only limited additions were made to the plantations. Numerous observations on particular phenomena were continued and are here detailed. *Capnodis* beetles continue to take heavy toll of deciduous fruit trees and no effective control has yet been found. With increased apple planting woolly aphis has also increased. It is, however, being successfully controlled by *Aphelinus mali*.

1718. PENNSYLVANIA. 633/635(748)
Fifty Eighth Annual Report Pennsylvania Agricultural Experiment Station 1944-45, being *Bull.* **475** (Science for the Farmer), pp. 48.

The following items would appear to be of particular interest:—*Orcharding*. Trials give no support to the view that fire blight in apples is associated with high N manuring. Considerable improvement is noted in the performance of the now structurally changed Speed Sprayer. Several advantages are noted in the use of phenothiazine zinc-lead arsenate as against that of other sprays against codling moth. Fermate-sulphur mixture offers a new method of rust control in apple trees. Cryolite, DDT and phenothiazine pasted with reduced amounts of lead arsenate were as effective against cherry fruit flies as lead arsenate alone. On 6-year-old peach trees 8 oz. applications of 7: 1 mixture of granulated superphosphate-ethylene dichloride gave excellent control of peach tree borer. Results with DDT were not entirely satisfactory against the following: plum curculio, pistol case bearers and aphids. On the other hand excellent control was achieved with it against leaf hoppers and grapeberry moth. Of 31 compounds tested those containing nickel and cadmium had fungicidal value of much promise. *Vegetable and flower growing*. New varieties are available of sweet corn, tomatoes, lettuce, peppers. Composts of straw, maize fodder and chemical fertilizer gave mushroom yields comparable with those obtained from horse manure. DDT showed high toxicity to mushroom flies. New fumigants and DDT showed promise against symphylids in glasshouses.

1719. PENNSYLVANIA STATE HORTICULTURAL ASSOCIATION. 633/635(748)
Proceedings of 82nd, 83rd, 84th, 85th and 86th Annual Meetings of Pennsylvania State Horticultural Association for 1941, 1942, 1943, 1944 and 1945.

These accounts have just come to hand. They all contain plenty of good practical advice for the grower. The subjects which are most frequently discussed in them and which a mainly concerned with apple and peach growing includ soil management, pest problems, particularly codling mo and the use of new insecticides, spray equipment. The la number contains articles on the Speed Sprayer and on DD for codling moth [for which see abstr. 1408].

1720. ROYAL METEOROLOGICAL SOCIETY. 55.1.5(05)
Weather, Vol. 1, No. 1, May 1946, pp. 32. 49 Cromwell Road, London, S.W.7. 1s. 6d. a number or 18s. a year, post free.

The attention of our readers is drawn to this new month publication which would appear to be justified by th increasingly widespread interest in the science of weathe No one, not even the most hopeful holiday maker, can b more interested in the weather than the horticulturist, an if he can learn even in small measure and within very narro limits to read more accurately the signs of the heavens an to appreciate better certain elementary meteorological fact he may sometimes refrain from planting foolishly an sometimes stave off disaster from growing crops.

The magazine is attractively dressed and should find a eager public.

1721. SEYCHELLES DEPARTMENT OF AGRICULTURE. 633/634(696)
Annual Report of the Department of Agriculture, Colony of Seychelles, for 1940, 1942, pp. 7 and ***abbreviated Reports for the years 1941, 1942, 1943 and 1944.***

Shorter and shorter accounts appear in these reports o (1) *Crop conditions*. Here figures and notes are given of th production and commerce in the following: (*a*) coconut (*b*) essential oils mainly cinnamon, patchouli and eucalyptu (*c*) vanilla, and (*d*) on food crop production in the colon On (2) *Work of the Department in these fields* and (*Legislation*.

1722. SIERRA LEONE. 634.3-2.78
Annual Report of the Department of Agriculture, Sierra Leone, for the year 1944, 1945, pp. 15, 1s. 6d.

Citrus growers will be interested in paras. 56, 58, 59 and 6 which concern citrus moth investigations, citrus and oth fruits attacked by moths, larval food plants of the mot and parasites found in fruit moth larvae bred in the labor tory.

1723. ST. VINCENT. 633/635(729.82)
Annual Report on the Agricultural Department St. Vincent, 1944, 1945, pp. 19.

A note is given of arrangements for transference of a planting material and nursery stocks from the grounds the Kingstown Experiment Station to Camden Park Estat Notes given with regard to work at the latter station co cern, among others, variety trials of sweet potatoes, th establishment of a cacao nursery, plant introductions.

1724. TANGANYIKA TERRITORY. 633.73(678.2/9)
Eleventh Annual Report of the Coffee Research and Experiment Station, Lyamungu, Moshi, for 1944, 1945, pp. 9, 6d., being *Pamphl.* **42.**

There is nothing very startling to report. The usual wa time frustrations can be seen in the absence of peat moss f vegetative propagation, of pyrethrum for *Antestia* contro of manures for the manurial experiment and of webbi for the artificial shade trial. Three years' experiments elephant grass mulch, compost and nitrogen have on so far shown the advantages of mulch. In a trial of Ken *versus* Bourbon 7 years' experiments show Kents leadi with an average clean cwt. per acre 8·51 against Bourbo 7·34. The multiple stem *versus* single stem trial continu and is ending its first cycle. In 1945 it would be partly the old system and partly on the new suckers of the secon cycle. The results of 3 years' irrigation and/or mulchi trial are tabulated. The highest 3-year mean clean cw

per acre was 8·24 from 4 inches water+40 lb. once a year mulch. The mulch was banana trash.

725. TEXAS. 633/635(764)
Fifty-seventh Annual Report of Texas Agricultural Experiment Station 1944, 1945, pp. 49.
The following items are of interest to horticulturists:—Attention is drawn to very promising hybrids between the Nessberry and the wild dewberry. They fill the gap between strawberries and blackberries. The berries are considerably larger than the ordinary blackberry, are fully hardy to Texas conditions and while good to eat fresh, make excellent jams and jellies. A new melon, Texas Cantaloupe No. 1, resistant to mildew and aphids, will now have been released to growers.

726. TRIPOLITANIA, BRITISH MILITARY ADMINISTRATION, DEPARTMENT OF AGRICULTURE. 63(616)
Survey of land resources in Tripolitania.
Tripolitania, 1945, pp. 156.
This report and its so-called annexures survey the present position of different types of cultivation and animal husbandry in Tripolitania and possible future developments. Many of the crops considered are horticultural. *Olives.* Olives have been grown since Roman times. Of late the Italians have introduced promising varieties from Tuscany but it seems to be too early to say whether under the very different climatic conditions of Tripoli their promise will be fulfilled. There appears to be a definite future for olive growing and there is plenty of suitable land for new extensive planting. If, however, the aim of the Arab population remains self-sufficiency, further olive planting is likely to be restricted in accordance with the capacity of secondary industries for absorbing the additional oil, and in its place will be planted carob and other forage crops which can be absorbed locally in unlimited amounts. Such an admixture is likely to favour the development of the livestock industry. *Almonds.* They are grown in association with olives and are well adapted to natural conditions, though very sensitive to violent winds and sharp falls in temperature at blossoming time. They are in full production 8 years from planting and benefit from the cultural operations afforded to the olive. They can profitably be removed when the olive is in full bearing at the end of 20 to 25 years. *Vines.* Vines in the past have been almost exclusively grown by the European population. They are planted in rows and pruned very short as in Sicily. Their future in Arab hands seems rather doubtful. *Figs.* The fig is both eaten and used for the production of alcohol. The latest recorded figures, which are for the period 1931-35, are 583,000 trees in production. *Carob or locust bean* (*Ceratonia siliqua*). It starts to bear at 10 years and should be producing 20 kg. of beans at 20 years and 50-70 kg. at 25 years. It has great possibilities as a forage crop. *Mesquit* (*Prosopis juliflora*). The suggestion is made that the mesquit might profitably be introduced as another good potential fodder crop. The present essentially Arab viewpoint is given in a short report at the end. The views largely correspond with those expressed in the body of the report. Since the Italian occupation Tripolitanian agriculture has been orientated towards the self-sufficiency and prosperity of the Italian settler. The time has now come for a change. Research will have its place and changes will also be necessary in the traditional methods of property inheritance, so that excessive subdivision is avoided. Production figures are given for 1944 and estimates for 1960 based both on normal development without change and on changes tentatively suggested.

1727. WASHINGTON. 634/635(797)
Fifty-fifth Annual Report of Washington Agricultural Experiment Station for 1944-45, 1945, pp. 165, being *Bull.* **470.**
The report consists of short synopses of work on all the very numerous projects undertaken by the research station. Experimental data are not included, but a list is given at the end of bulletins and articles published during the year by members of staff on particular problems. Some of the headings will give an idea of the great importance of horticultural work in the State of Washington. Divisional reports including those on Entomology, Horticulture and Plant Pathology. Irrigation Branch Experiment Station, Tree Fruit Branch Experiment Station, Cranberry-Blueberry Laboratory, U.S. Fruit and Vegetable Products Laboratory, Western Washington Experiment Station Puyallup, Vegetable Seed Investigations, Clark County Horticultural Investigations.

1728. WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION. 633/635(754)
Biennial Report of West Virginia Agricultural Experiment Station 1942-44, pp. 55, being *Bull.* **317.**
From short notes on fruit and vegetable work the following among other conclusions are reached:—In fertilizer trials lasting from 1936 to 1944, 7 lb. nitrate was given per tree per year in a commercial apple orchard in 4 different forms, viz. Chile nitrate of soda, sulphate of ammonia, cyanamide, and Uramon. All proved equally satisfactory. The value of different green manure crops for apple orchards and of different cultural treatment is being slowly determined. The apparent merits of Korean lespedeza, ladino clover, dwarf sweet clover, crown vetch and blue grass sod are briefly discussed. Progress has been made in increasing the colour of apples by the use of thiocyanate sprays. No ill effects have been noticed in subsequent years and there are indications that the fruit keeps rather better in store. The search for an outstanding blueberry continues.

1729. The following also have been examined:

a ANON.
Le jardin de la famille. (*The home garden.*)
Édition du Secours National, Paris, (1942 or 1943 ?), pp. 190.
Vegetables and fruits. Illustrated.

b *A.R. Barbados Dep. Sci. Agric. for 1944-45*, pp. 17.

c MINISTÈRE DE LA FRANCE D'OUTRE-MER 63(44)
Rapport d'Activité pour l'année 1945 de l'Office de la Recherche Scientifique Coloniale, pp. 52.
Description of aims and of establishments set up to achieve them.

d *A.R. Dep. Agric. Uganda Protectorate 1944-45, Part I. Administrative*, 1946, pp. 44, Shs. 2/50.